

# **Soil Survey Laboratory Data and Descriptions for Some Soils of...**

**...IOWA**

SOIL CONSERVATION SERVICE • U.S. DEPARTMENT OF AGRICULTURE  
In cooperation with  
IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION

Soil Survey Investigations Report No. 3

# Soil Survey Laboratory Data and Descriptions for

Cross Section of

... IOWA

August 1966

1. SAMPLE COLLECTION AND PREPARATION
  - A. Field sampling
    1. Site selection
    2. Soil sampling
      - a. Stony soils
  - B. Laboratory preparation
    1. Standard (airdry)
      - a. Square-hole 2-mm sieve
      - b. Round-hole 2-mm sieve
    2. Field moist
    3. Carbonate-containing material
    4. Carbonate-indurated material
2. CONVENTIONS
  - A. Size-fraction base for reporting
    1. <2-mm
    2. <size specified
  - B. Data-sheet symbols
 

tr: trace, not measurable by quantitative procedure used or less than reportable amount

tr(s): trace, detectable only by qualitative procedure more sensitive than quantitative procedure used

analysis run but none detected

-(s): none detected by sensitive qualitative test

blank: analysis not run

nd: analysis not run

<: less than reported amount or none present
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      - a. Carbonate and noncarbonate clay
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    2. Volume estimates
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      - d. 1/3-bar desorption I
      - e. 1/3-bar desorption II
      - f. 1/3-bar desorption III
      - g. 1/10-bar desorption
      - h. Oven-dry
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      - a. Oven-dry
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    4. Nonpolar-liquid-saturated clods
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    1. Thin sections
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    - a. Centrifuge method
  3. Sum of cations
    - a. Acidity by BaCl<sub>2</sub>-TEA, pH 8.2; bases by NH<sub>4</sub>OAc, pH 7.0
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    2. NaOAc, pH 8.2
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      - a. CO<sub>2</sub> evolution I
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      - a. Weight loss
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## PREFACE

This publication is one in a new U.S. Department of Agriculture series established to preserve and make available technical information resulting from soil survey investigations. These investigations have been going on for about two decades. Data from them have been distributed in unpublished form to those immediately concerned. Some of the data and descriptions have appeared in technical journals, in regional bulletins, in USDA technical bulletins, and in the text of published soil surveys. But most were not available to all who might use them.

We intend to publish in this series all data from the soil survey laboratories that form reasonably complete characterizations of soils. Already-assembled data and descriptions will be published just as rapidly as they can be prepared for printing. Fragmentary data collected as reference points for specific soil surveys will not be included.

While these data were being assembled, there were many changes in laboratory methods. Some were improved and some new ones were devised. Consequently, laboratory data for different soils cannot always be directly compared without allowance for the method.

The method used is indicated by symbol in the column headings of the data table. These symbols are identified in the code sheet on the opposite page. Each method is described in the first number of this series, "Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples," SSIR No. 1.

Ways of describing soils have also changed. Soil descriptions have become explicit on more and more features. The systems for designating horizons and for classifying soils have been changed.

The soil descriptions published here were prepared as working documents to meet a specific need of a soil survey at the time the soil samples were collected. The soil scientists who wrote them had no idea they would be published. Editing has been limited for the most part to that necessary for conformance to the "Soil Survey Manual." Field textural estimates have been retained, even though some are at variance with the laboratory data, because the field estimates themselves are important data.

There were several reasons for sampling these soils. Some were sampled to study soil genesis, some to facilitate classification, and some to obtain data to permit more useful interpretations. Those sampled for genesis or classification studies do not always fit neatly into our present concepts of soil series. Partly because of these studies, our concepts of some soil series have been modified. As a consequence, the soil series name assigned a soil at the time of sampling is not always the name that would be assigned today. Soil series names in this publication follow 1965 series definitions.

*Soil Survey  
Soil Conservation Service*



## IOWA

<u>Soil Series</u>	<u>County</u>	<u>Soil Survey No.</u>	<u>Page</u>	<u>Soil Series</u>	<u>County</u>	<u>Soil Survey No.</u>	<u>Page</u>
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	Shelby	S55Iowa-83-2	5		Harrison	S59Iowa-43-1	95
Arbor	Adair	S56Iowa-1-1	7		Harrison	S59Iowa-43-2	97
	Adair	S56Iowa-1-2	9		Harrison	S59Iowa-43-3	99
Bonair	Howard	S56Iowa-45-11	11		Harrison	S59Iowa-43-4	101
	Howard	S56Iowa-45-12	13		Harrison	S59Iowa-43-5	103
Clarinda	Shelby	S53Iowa-83-4	15		Harrison	S59Iowa-43-6	105
	Shelby	S55Iowa-83-1	17		Harrison	S59Iowa-43-8	107
Clinton	Washington		19	Muscatine	Benton	S60Iowa-6-1	109
	Washington		21		Grundy	S60Iowa-38-1	111
Clyde	Howard	S56Iowa-45-4	23	Napier	Harrison	S58Iowa-43-6	113
	Howard	S56Iowa-45-10	25		Harrison	S58Iowa-43-9	115
Cresco	Howard	S56Iowa-45-1	27	Olmitz	Adair	S56Iowa-1-3	117
	Howard	S56Iowa-45-9	29		Adair	S56Iowa-1-4	119
Dinsdale	Black Hawk	S60Iowa-7-1	31	Otley	Keokuk	S61Iowa-54-2	121
	Grundy	S60Iowa-38-2	33		Washington	S61Iowa-92-1	123
Edina	Wayne	S59Iowa-93-1	35	Primghar	Clay	S59Iowa-21-4	125
Everly	Clay	S59Iowa-21-7	37		O'Brien	S59Iowa-71-2	127
	Clay	S59Iowa-21-8	39	Protivin	Howard	S56Iowa-45-2	129
Fayette	Clayton	S59Iowa-22-1	41		Howard	S56Iowa-45-3	131
	Jackson		43	Readlyn	Bremer	S60Iowa-9-2	133
	Linn		45		Bremer	S60Iowa-9-4	135
Hamburg	Fremont	S61Iowa-36-1	47	Riceville	Howard	S56Iowa-45-6	137
Ida	Fremont	S61Iowa-36-2	49		Howard	S56Iowa-45-8	139
	Harrison	S58Iowa-43-5	51	Sac	Clay	S59Iowa-21-5	141
	Harrison	S59Iowa-43-7	53		Clay	S59Iowa-21-6	143
Kenyon	Bremer	S60Iowa-9-1	55	Sharpsburg	Adair	S55Iowa-1-3	145
	Bremer	S60Iowa-9-3	57		Adair	S55Iowa-1-4	147
Klinger	Bremer	S60Iowa-9-5	59		Adair	S55Iowa-1-5	149
	Bremer	S60Iowa-9-6	61		Adair	S55Iowa-1-6	151
Lourdes	Howard	S56Iowa-45-5	63		Adair	S56Iowa-1-11	153
	Howard	S56Iowa-45-7	65		Polk	S51Iowa-77-7	155
Macksburg	Adair	S61Iowa-1-1	67	Shelby	Adair	S56Iowa-1-5	157
	Adair	S55Iowa-1-1	69		Adair	S56Iowa-1-6	159
	Adair	S55Iowa-1-2	71		Adair	S56Iowa-1-7	161
	Madison	S61Iowa-61-1	73		Adair	S56Iowa-1-8	163
Mahaska	Keokuk	S61Iowa-54-1	75		Adair	S56Iowa-1-9	165
	Washington	S61Iowa-92-2	77		Adair	S56Iowa-1-10	167
Marcus	Clay	S59Iowa-21-3	79		Shelby	S55Iowa-83-3	169
	O'Brien	S59Iowa-71-1	81		Shelby	S53Iowa-83-3	171
Monona	Harrison	S58Iowa-43-1	83	Taintor	Keokuk	S61Iowa-54-3	173
	Harrison	S58Iowa-43-2	85		Washington	S61Iowa-92-3	175
	Harrison	S58Iowa-43-3	87	Tama	Tama	S59Iowa-86-1	177
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Adair	Arbor	S56Iowa-1-1	7
	Arbor	S56Iowa-1-2	9
	Macksburg	S61Iowa-1-1	67
	Macksburg	S55Iowa-1-1	69
	Macksburg	S55Iowa-1-2	71
	Olmitz	S56Iowa-1-3	117
	Olmitz	S56Iowa-1-4	119
	Sharpsburg	S55Iowa-1-3	145
	Sharpsburg	S55Iowa-1-4	147
	Sharpsburg	S55Iowa-1-5	149
	Sharpsburg	S55Iowa-1-6	151
	Sharpsburg	S56Iowa-1-11	153
	Shelby	S56Iowa-1-5	157
	Shelby	S56Iowa-1-6	159
	Shelby	S56Iowa-1-7	161
	Shelby	S56Iowa-1-8	163
	Shelby	S56Iowa-1-9	165
	Shelby	S56Iowa-1-10	167
	Muscatine	S60Iowa-6-1	109
Benton	Dinsdale	S60Iowa-7-1	31
Black Hawk	Kenyon	S60Iowa-9-1	55
	Kenyon	S60Iowa-9-3	57
Bremer	Klinger	S60Iowa-9-5	59
	Klinger	S60Iowa-9-6	61
	Readlyn	S60Iowa-9-2	133
	Readlyn	S60Iowa-9-4	135
Clay	Everly	S59Iowa-21-7	37
	Everly	S59Iowa-21-8	39
	Marcus	S59Iowa-21-3	79
	Pringhar	S59Iowa-21-4	125
Clayton	Sac	S59Iowa-21-5	141
	Sac	S59Iowa-21-6	143
	Fayette	S59Iowa-22-1	41
Fremont	Hamburg	S61Iowa-36-1	47
	Ida	S61Iowa-36-2	49
Grundy	Dinsdale	S60Iowa-38-2	33
	Muscatine	S60Iowa-38-1	111
Harrison	Ida	S58Iowa-43-5	51
	Ida	S59Iowa-43-7	53
	Monona	S58Iowa-43-1	83
	Monona	S58Iowa-43-2	85
	Monona	S58Iowa-43-3	87
	Monona	S58Iowa-43-4	89
	Monona	S58Iowa-43-7	91
	Monona	S58Iowa-43-8	93
	Monona	S59Iowa-43-1	95
	Monona	S59Iowa-43-2	97
	Monona	S59Iowa-43-3	99
	Monona	S59Iowa-43-4	101
	Monona	S59Iowa-43-5	103
	Monona	S59Iowa-43-6	105
	Monona	S59Iowa-43-8	107
	Napier	S58Iowa-43-6	113
	Napier	S58Iowa-43-9	115
Howard	Bonair	S56Iowa-45-11	11
	Bonair	S56Iowa-45-12	13
	Clyde	S56Iowa-45-4	23
	Clyde	S56Iowa-45-10	25
	Cresco	S56Iowa-45-1	27
	Cresco	S56Iowa-45-9	29
	Lourdes	S56Iowa-45-5	63
	Lourdes	S56Iowa-45-7	65
	Protivin	S56Iowa-45-2	129
	Protivin	S56Iowa-45-3	131
Jackson	Riceville	S56Iowa-45-6	137
	Riceville	S56Iowa-45-8	139
	Fayette		43

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Keokuk	Mahaska	S61Iowa-54-1	75
	Otley	S61Iowa-54-2	121
	Taintor	S61Iowa-54-3	173
Linn	Fayette		45
Madison	Macksburg	S61Iowa-61-1	73
	Winterset	S61Iowa-61-2	179
	Winterset	S61Iowa-61-3	181
O'Brien	Marcus	S59Iowa-71-1	81
	Pringhar	S59Iowa-71-2	127
Polk	Sharpsburg	S51Iowa-77-7	155
Shelby	Adair	S53Iowa-83-2	3
	Adair	S55Iowa-83-2	5
	Clarinda	S53Iowa-83-4	15
	Clarinda	S55Iowa-83-1	17
	Shelby	S55Iowa-83-3	169
	Shelby	S53Iowa-83-3	171
	Tama	S59Iowa-86-1	177
Tama	Clinton		19
	Clinton		21
	Mahaska	S61Iowa-92-2	77
Washington	Otley	S61Iowa-92-1	123
	Taintor	S61Iowa-92-3	175
	Edina	S59Iowa-93-1	35
Wayne			

SOIL SURVEY LABORATORY Lincoln, Nebr. Dec. 17, 1957

SOIL TYPE Adair LOCATION Shelby County, Iowa  
silty clay loam, silty variant

SOIL NOS. S53Iowa-83-2 LAB. NOS. 5383-5388

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (19mm)	
0-7	Ap	0.1	0.3	0.5	1.2	2.3	64.0	31.6	41.6	25.3	-	sic1
7-16	AB	0.2	0.5	0.6	1.8	2.5	57.3	37.1	37.3	23.7	-	sic1
16-22	B21	0.1	0.5	0.7	2.0	3.0	52.1	41.6	33.3	22.9	-	sic
22-29	B22	-	0.6	0.9	2.6	3.7	49.3	42.9	32.0	22.5	-	sic
29-36	B3	0.1	0.9	1.5	3.9	4.2	48.1	41.3	31.0	23.4	-	sic
36-45	C	0.2	1.1	2.0	5.0	1.8	17.1	20.2	20.5	21.0	-	sic

Soil type: Adair silty clay loam, silty variant  
Soil No.: S53Iowa-83-2  
Location: Northwest corner of NE1/4 of Sec. 13, T80N, R38W, Shelby County, Iowa.  
Site: 12 percent slope.  
Collected by and date: O. D. Friedrich, October 30, 1953.

Horizon and  
Lincoln  
Lab. Number

Ap 5383	0 to 7 inches. Very dark brown (10YR 2/2) heavy silt loam or light silty clay loam with weak medium granular structure; few, very fine, faint, yellowish red mottles; some thin gray coatings on peds; abrupt boundary.
AB 5384	7 to 16 inches. Dark brown (10YR 3.5/3) slightly gritty medium to heavy silty clay loam; moderate very fine subangular blocky structure; some dark material from A horizon in worm channels; clear boundary.
B21 5385	16 to 22 inches. Variegated very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) to brown (10YR 4/3); crushed color dark brown (10YR 3.5/3); gritty silty clay or clay; moderate very fine subangular blocky structure with moderate vertical cleavage; some dark coatings on peds and a few fine yellowish red mottles; clear boundary.
B22 5386	22 to 29 inches. Brown (10YR 4.5/3) gritty silty clay or clay; moderate very fine subangular blocky structure with strong vertical cleavage; many very fine faint yellowish red mottles and some dark oxide concretions; clear boundary.
B3 5387	29 to 36 inches. 10YR 5/3 gritty silty clay or clay; weak very fine subangular blocky with weak vertical cleavage; many 5YR 4/6 mottles and some dark mottles; clear boundary.

OIL TYPE Adair  
silt loam

LOCATION Shelby County, Iowa

SOIL NOS. S55Iowa-83-2

LAB. NOS. 5360-5369

Soil type: Adair silt loam

Soil No.: 855Iowa-83-2

Location: 30 yards south and 130 yards east of northwest corner of NW1/4 of NW1/4 of Sec. 30, Monroe Township, T78N, R38W, Shelby County, Iowa.

Slope: West-facing.

Collected by and date: R. Prill, W. Jury, and M. Koppen, September, 1955.

Horizon and

Lincoln

Lab. Number

Ap	0 to 6 inches. Dark brown to brown (10YR 4/3) silt loam with fine granular structure; friable; (mixture from loess on slope above in till-like material--pedi-sediment?)
5360	
A1	6 to 12 inches. Dark brown to brown (10YR 4/3) heavy silt loam with moderate medium subangular blocky structure; slightly hard; abundant pinholes; boundary abrupt.
5361	
A3B1	12 to 19 inches. Dark brown to brown (10YR 4/3) medium silty clay loam with common, coarse, very dark grayish brown (10YR 3/2) mottles; moderate medium subangular blocky structure; slightly hard; pinholes abundant; diffuse boundary.
5362	
B1	19 to 25 inches. Dark reddish brown (5YR 3/4) heavy silty clay loam; moderate medium subangular blocky; slightly hard to hard; boundary diffuse; pinholes present.
5363	
B21	25 to 31 inches. Dark reddish brown (5YR 3/4) clay. 45 to 50 percent estimate with few fine yellowish

B22 31 to 37 inches. Same description as B21 except boundary diffuse.  
5365

B3 37 to 42 inches. Yellowish brown (10YR 5/6) medium clay loam with common, fine, dark reddish brown (5YR 3/4) mottles; weak medium subangular blocky structure; firm; few iron and manganese concretions; clear boundary.  
5366

C1 42 to 46 inches. Yellowish brown (10YR 5/6) light clay loam with few dark reddish brown (5YR 3/4) mottles; firm; massive; diffuse boundary.  
5367

C2 46 to 55 inches. Yellowish brown (10YR 5/6) light clay loam with few fine, dark reddish brown (5YR 4/3) and few very dark grayish brown (2.5Y 3/2) mottles; massive; firm; diffuse boundary.  
5368

Oca 55 to 62 inches. Yellowish brown (10YR 5/6) light clay loam with fine common very dark grayish brown (2.5Y 3/2) mottles; massive; firm; calcareous; clear boundary.  
5369

Note: Colors are for moist conditions.

## SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Arbor LOCATION Adair County, Iowa  
silty clay loam

SOIL NOS. 556 Iowa-1-1 LAB. NOS. 5704-5712

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS	
		1B1b						3A1					2A2
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2 mm		
		2.1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	< 75µm		
0-5	A11	0.2	1.0	1.5	2.7	2.0	57.0	35.6	33.4	26.9	<	sic1	
5-15	A12	0.4	1.5	2.2	4.3	3.2	52.1	36.3	32.1	25.6	<	sic1	
15-19	AB	1.1	2.3	3.8	6.8	4.6	46.9	34.5	31.9	23.2	<	sic1	
19-22	B21	1.7	3.1	4.6	8.4	5.9	42.5	33.8	31.5	21.5	3	cl	
22-24	B22	1.9	4.1	5.4	10.3	8.1	37.4	32.8	31.3	19.9	35	cl	
24-34	ITB23	1.8	4.1	5.8	11.1	9.6	34.2	33.4	30.7	19.2	1	cl	
34-45	ITB31	1.4	3.9	5.6	10.6	9.5	35.2	33.8	30.2	20.5	1	cl	
45-55	ITB32	2.3	4.6	5.7	10.7	8.7	38.5	29.5	32.0	21.4	4	cl	
55-72	ITC	3.3	5.8	7.2	13.5	9.9	38.2	22.1	35.2	20.3	6	1	
pH													
8C1a			ORGANIC MATTER			ESTR SALT (BUREAU CUP)	ELECTRI- CAL CONDUCTI- VITY EC x 10 <sup>3</sup> MILLIMHOS PER CM 25°C.	6E1e CoCO <sub>3</sub> equiv- alent	GYPSUM mg./100g. SOIL	MOISTURE TENSIONS			
	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N					1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.	
	1:1		%	%				%		%	%		
5.8			2.53	0.240	10.5								
5.6			1.81	0.174	10.4								
5.6			1.23	0.128	9.6								
5.7			0.97	0.100	9.7								
5.8			0.63	0.074	8.5								
5.9			0.35	0.045	7.8								
6.3			0.24	0.039				<					
7.6			0.16	0.030				<					
7.7			0.11	0.020				7					
5A3a	EXTRACTABLE CATIONS 5B1a					BASE SAT. %	SATURATION EXTRACT SOLUBLE					MOISTURE AT SATU- RATION %	
CATION EXCHANGE CAPACITY Sum	6N2d Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K		No	K					
	milliequivalents per 100g. soil					5C3	milliequivalents per liter					%	
32.5	16.8	5.2	9.9	0.1	0.5	70							
31.2	16.0	4.8	9.9	0.1	0.4	66							
27.5	14.8	4.6	7.6	0.1	0.4	72							
22.7	12.1	3.5	6.7	0.1	0.3	70							
22.4	12.6	3.8	5.6	0.1	0.3	75							
21.6		4.3	2.9	0.1	0.4	87							
20.1		3.1	4.0	0.1	0.3	80							
Calcareous													
Calcareous													

Soil type: Arbor silty clay loam

Soil No.: 856Iowa-1-1

Location: Greenfield Quadrangle; 130 feet west and 66 feet north of southeast corner of northwest quarter of northeast quarter of southeast quarter of Section 18, T76N, R31W, Adair County, Iowa, on lower 1/3 of 12 percent slope.

Slope: 12 percent.

Vegetation: Bluegrass.

Collected by and date: R. B. Daniels, July 10, 1956.

Horizon and

Beltsville

Lab. Number

A11 5704	0 to 5 inches. Very dark brown (10YR 2/2) friable gritty light to medium silty clay loam; moderate to strong, fine and very fine granular structure; gradual boundary to A12.
A12 5705	5 to 15 inches. Very dark brown (10YR 2/2) friable gritty medium silty clay loam; strong fine and medium granular structure; gradual boundary to AB.
AB 5706	15 to 19 inches. Very dark gray brown (10YR 3/2) friable gritty medium silty clay loam to clay loam with more sand than A12; moderate to strong fine subangular blocky structure; clear boundary to B21.
B21 5707	19 to 22 inches. Mixed dark brown and very dark gray brown (10YR 4/3 and 3/2) friable medium clay loam; moderate to strong fine subangular blocky structure with thin continuous clay skins; abrupt boundary to B22 (stone line).
B22	22 to 24 inches. Dark brown (10YR 4/3) firm medium clay loam with some mixing of very dark gray brown



SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Arbor loam LOCATION Adair County, Iowa

SOIL NOS. 856Iowa-1-2 LAB. NOS. 5713-5721

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1b	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (76mm)	
0-6	A1p	1.4	5.4	8.2	15.7	8.6	34.9	25.8	35.8	16.2	<1	1
6-12	A12	1.2	5.0	7.7	14.7	8.5	35.9	27.0	35.1	17.3	<1	1/cl
12-16	AB	1.6	5.1	7.1	13.2	8.3	36.7	28.0	34.0	18.1	1	cl

Soil type: Arbor loam  
 Soil No.: S56Iowa-1-2  
 Location: Greenfield Quadrangle; 490 feet east and 100 feet south of northwest corner of northwest quarter of southeast quarter of northwest quarter of Section 18, T76N, R31W, Adair County, Iowa.  
 Slope: 14 percent, slightly concave.  
 Vegetation: Cultivated field.  
 Collected by and date: R. B. Daniels, F. J. Carlisle, and G. H. Simonson, July 26, 1956.

Horizon and  
 Beltsville  
 Lab. Number

Alp 0 to 6 inches. Very dark brown to very dark gray brown (10YR 2.5/2) very friable heavy loam; cloddy, which breaks to weak fine granular; very dark brown to very dark gray brown (10YR 2.5/2) crushed and dark gray brown (10YR 4/2) dry; clear boundary to A12.  
 5713  
 A12 6 to 12 inches. Very dark brown (10YR 2/2) very friable heavy loam; weak fine and very fine granular structure; very dark brown to very dark gray brown (10YR 2.5/2) crushed and dark gray brown (10YR 4/2) dry; clear boundary to AB.  
 5714  
 AB 12 to 16 inches. Very dark gray brown (10YR 3/2) very friable heavy loam to light clay loam with some mixing of very dark brown (10YR 2/2) along channels; weak to moderate fine and very fine subangular blocky structure; very dark gray brown to dark gray brown (10YR 3.5/2) crushed and brown (10YR 5/3) dry; clear boundary to B21.  
 5715  
 B21 16 to 21 inches. Dark brown (10YR 4/3) friable light clay loam with some mixing of very dark brown and very dark gray brown (10YR 2/2 and 3/2) along vertical channels; weak fine subangular blocky structure with thin discontinuous coatings but identification as clay skins doubtful: dark brown (10YR 4/3) and

B22 21 to 23 inches. Dark brown (10YR 4/5) friable light clay loam with some mixing of very dark brown (stone line) and very dark gray brown (10YR 2/2 and 3/2) along vertical channels; weak fine subangular blocky structure with thin discontinuous coatings; material greater than 2-mm. ranges up to 7 inches in diameter, but is dominantly less than 2 inches in diameter; abrupt boundary to IIB23 and Kansan till.  
 5717  
 IIB23 23 to 30 inches. Dark brown to brown (10YR 4.5/3) friable light to medium clay loam with an increase in coarse sand over the B21; weak fine subangular blocky structure with thin discontinuous clay skins; dark yellowish brown (10YR 4/4) crushed and yellowish brown to light yellowish brown (10YR 5.5/4) dry; clear boundary to IIB31.  
 5718  
 IIB31 30 to 40 inches. Dark brown to dark yellowish brown (10YR 4/3.5) slightly firm light clay loam; common fine to medium faint to distinct gray brown (2.5Y 5/2) and strong brown mottles which have a tendency to be arranged in indistinct horizontal bands; weak medium blocky structure with few smooth surfaces which cannot be identified with certainty as clay skins; gradual boundary to IIB32.  
 5719  
 IIB32 40 to 50 inches. Dark brown (1Y 4/3) slightly firm light clay loam; fine distinct strong brown to dark brown and gray brown (2.5Y 5/2) mottles; distinct strong brown (7.5Y 5/6) which grades to dark

SOIL SURVEY LABORATORY Lincoln, Nebr. 1/27/58

SOIL TYPE \*Bonair loam LOCATION Howard County, Iowa

SOIL NOS. S56Iowa-45-11-(1-10) LAB. NOS. 4944-4953

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS	
		1B1a						3A1					2A2
		VERY COARSE SAND 2-7	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002 ( $\leq 9\mu$ )	> 2		
0-8	Ap	1.0	8.4	8.7	11.1	3.6	52.3	14.9	30.6	29.4	-	sil	
8-12	A21	1.2	8.3	9.6	12.8	3.6	47.8	16.7	29.1	26.9	-	1	
12-15	A22	2.7	9.9	11.5	15.9	4.1	37.1	18.8	26.5	20.6	Tr.	1	
15-19	IIB1	2.5	11.2	12.6	18.6	5.9	26.6	22.6	25.4	14.4	2	scl	
19-23	IIB21	3.9	6.1	5.8	11.3	8.3	30.7	33.9	27.2	17.2	2	cl	
23-28	IIB22	2.6	6.8	6.7	12.1	8.8	28.7	34.3	27.3	16.0	-	cl	
28-33	IIB23	3.2	6.7	5.8	11.0	8.6	29.9	34.8	27.1	16.8	2	cl	
33-38	IIB24	3.4	6.0	6.4	11.2	8.8	30.6	33.6	28.9	16.9	2	cl	
38-46	IIB3	2.7	5.8	6.5	11.1	9.2	32.1	32.6	29.7	17.9	Tr.	cl	
46-55	IIC1	4.2	5.9	6.0	10.7	9.1	33.7	30.4	29.1	20.0	2	cl	
pH 8C1a		ORGANIC MATTER					ELECTRI- CAL CONDUCT- IVITY EC $\times 10^3$ MILLIMHOS PER CM 6A1a	6E1a	4A3a	MOISTURE TENSIONS			
		1:5	1:10	ORGANIC CARBON % 6A1a	NITRO- GEN % 6B1a	C/N		CoCO <sub>3</sub> equiv- alent % 6E1a	Vol. Wt. g/cc 4A3a			15 ATMOS. % 4E2	
5.6	5.8	5.9	1.78	.154	11.6		0.5					7.2	
5.2	5.4	5.5	0.35	.045	7.8		0.3		1.46			6.1	
5.1	5.4	5.5	0.24	.033	7.3		0.2					6.8	
4.9	5.3	5.4	0.23	.029	7.9		0.2					7.5	
4.8	5.2	5.3	0.28	.030	9.3		0.2					10.8	
4.7	5.2	5.3	0.27	.027	10.0		0.2		1.58			12.4	
4.6	5.3	5.3	0.27				0.2					12.6	
5.2	5.5	5.6	0.20				0.2					11.9	
6.6	7.1	7.2	0.15				0.3					11.9	
8.0	8.5	8.7	0.15				0.5	5	1.80			11.7	
5A1a		EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH <sub>4</sub> Ac EXCH.	SATURATION EXTRACT SOLUBLE 6A1				8A	
CATION EXCHANGE CAPACITY + NH <sub>4</sub> Ac	6N2b	6O2b	6H1a	6P2a	6Q2a		6P1a	6Q1a	6N1a	6O1a		MOISTURE AT SATU- RATION %	
	Ca	Mg	H	Na	K		Na	K	Ca	Mg			
milliequivalents per 100g. soil						5C1	milliequivalents per liter						
13.4	6.6	1.3	9.9	-	0.2	60	0.5	0.2	3.2	1.4		36.0	
10.2	5.1	1.2	6.2	-	0.1	63	0.4	0.1	1.3	1.0		34.3	
11.3	5.3	1.0	6.6	-	0.1	57	0.4	0.1	1.0	0.8		35.2	
12.8	6.4	1.6	7.5	-	0.1	63	0.3	0.1	0.9	0.6		39.5	
17.1	8.3	2.1	7.1	-	0.2	62	0.3	0.1	0.8	0.1		51.2	
19.4	10.0	2.8	10.0	0.1	0.2	68	0.3	0.1	0.6	0.5		54.1	
20.2	11.1	2.9	9.6	0.1	0.2	71	0.4	0.1	0.6	0.8		57.7	
19.0	11.6	3.2	6.7	0.1	0.2	79	0.5	0.1	0.9	0.6		55.3	
17.4	14.0	4.1	2.9	0.1	0.2		0.6	-	1.6	0.9		54.3	
14.3		3.3	-	0.1	0.2		0.7	-	2.8	1.1		51.4	

Soil type: \*Bonair loam  
 Soil No.: S56Iowa-45-11-(1-10)  
 Location: Approximately 815 feet west and 195 feet north of southeast corner of NW1/4 of Sec. 3, T98N, R13W, Howard County, Iowa.  
 Vegetation or crop: Corn.  
 Parent material: Firm Iowan till with silty overburden.  
 Physiographic position: Ridge crest on upland about 1 mile from stream.  
 Topography: Gently sloping to undulating.  
 Slope: 3 percent.  
 Drainage: Moderately well drained.  
 Ground water: None observed within 55 inches.  
 Permeability: Very slow for the firm till and moderate for the overburden.  
 Moisture: Slightly moist.  
 Described by: L. E. Tyler, October 17, 1956.

Horizon and  
 Lincoln  
 Lab. Number

Ap 4944	0 to 8 inches. Very dark gray (10YR 3/1 moist) gritty silt loam; friable; moderate fine granular structure with a little weak platy; some A2 incorporated in Ap; boundary abrupt.
A21 4945	8 to 12 inches. Mixed colors, approximately 80 percent brown (10YR 5/3 moist) and 20 percent dark gray brown (10YR 4/2 moist); crushed color dark gray brown (10YR 4/2 moist); gritty silt loam; friable; weak fine to very fine platy structure breaking to weak very fine subangular blocky; some mixing by worms; boundary gradual.
A22 4946	12 to 15 inches. Brown (10YR 5/3 moist) heavy loam; crushed color brown (10YR 4.5/3 moist); friable; moderate very fine subangular blocky structure; boundary clear to gradual.
IIB1 4947	15 to 19 inches. Dark gray brown (10YR 4/2 moist) with many medium faint dark brown to dark yellowish brown (10YR 4/3 to 4/4 moist) mottles; crushed color yellowish brown (10YR 5/4 moist); heavy loam to light clay loam; friable; moderate fine and very fine subangular blocky structure; pebble band (pebbles 1/2- to 1-inch diameter) occurs in this horizon; also much more grit in this horizon than in those above; boundary clear.
IIB21 4948	19 to 23 inches. Prism faces light gray (10YR 7/1 dry); ped faces gray to light gray (5Y 6/1 moist) with common fine distinct yellowish brown (10YR 5/4 moist) mottles; ped interiors mixed gray (5Y 5/1 moist) and strong brown (7.5YR 5/6 moist); crushed color yellowish brown (10YR 5/6 moist); medium clay loam; firm; weak medium prismatic structure breaking to strong fine subangular blocky; a light gray coating present on vertical (prism) faces which carries to a limited degree into the horizon below; boundary clear.
IIB22 4949	23 to 28 inches. Ped faces mixed dark gray to gray (N 4/0 to 5/0 moist) with common medium distinct dark brown (7.5YR 4/2 to 10YR 4/3 moist) mottles; interiors mixed, approximately 65 percent strong brown (7.5YR 4/6 moist) and 35 percent gray (5Y 5/1 moist); crushed color dark yellowish brown to yellowish brown (10YR 4.5/4 moist); medium clay loam; firm to very firm; moderate fine to medium prismatic breaking to strong medium angular blocky; faces become much darker in this horizon and old root channels are filled with very dark gray (N 3/0 moist) transported clay; boundary diffuse.
IIB23 4950	28 to 33 inches. Ped faces gray (2.5Y 5/1 moist) with some dark gray to very dark gray (N 3/0 to 4/0 moist) transported clay streaks; also common medium distinct yellowish brown (10YR 5/4 moist) mottles; ped interiors mixed, approximately 40 percent gray (5Y 5/1 moist) and 60 percent dark yellowish brown (10YR 4/4 moist); crushed color yellowish brown (10YR 5/4 moist); medium clay loam; firm to very firm; moderate medium prismatic structure breaking to strong medium angular blocky; boundary clear.

SOIL SURVEY LABORATORY Lincoln, Nebr. 1/27/58

SOIL TYPE \*Bonair LOCATION Howard County, Iowa  
loam

SOIL NOS. S56Iowa-45-12-(1-11) LAB. NOS. 4954-4964

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										TEXTURAL CLASS
		1B1a						2A2				
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002 ( $< 19\mu$ )	> 2	
0-5	Ap	2.4	7.2	7.5	9.3	4.4	55.4	13.8	35.3	29.2	-	s11
5-9	A21	2.4	5.8	6.0	7.8	4.2	57.2	16.6	31.7	33.7	Tr.	s11
9-12	A22	3.8	6.1	5.9	8.8	6.1	47.1	22.2	30.4	27.6	3	l
12-15	B21	3.2	5.2	5.5	9.8	8.3	36.2	31.8	30.4	19.9	Tr.	cl
15-19	11B22	2.1	5.2	5.3	11.3	9.1	31.2	35.8	29.2	16.9	Tr.	cl
19-23	11B23	2.3	5.1	5.3	10.8	8.7	29.9	37.9	28.0	16.0	2	cl
23-28	11B24	2.6	5.2	5.0	10.4	8.5	31.1	37.2	27.7	17.1	1	cl
28-36	11B31	2.6	5.6	5.7	11.5	9.1	31.4	34.1	28.2	18.1	2	cl
36-44	11B32	3.2	6.8	7.3	12.3	9.4	30.8	30.2	31.0	16.4	3	cl
44-51	11C1	3.6	6.6	6.0	11.6	9.6	33.2	29.4	30.7	17.9	2	cl
51-60	11C2	3.2	5.8	5.2	11.1	9.4	35.6	29.7	31.0	19.0	4	cl
	pH 8C1a	ORGANIC MATTER					ELECTRI- CAL CONDUCTI- VITY EC-103 MILLIMHOS PER CM 6A1a	6E1a CaCO <sub>3</sub> equiv- alent %	4A3a Vol. Wt. g/cc	MOISTURE TENSIONS		15 ATMOS. %
		6A1a	6B1a			6B2						
		1:5	1:10	ORGANIC CARBON %	NITRO- GEN %	C/N				EST% SALT (BUREAU CUP)	15 ATMOS. %	
6.0	6.1	6.2	1.34	.120	11.2		0.5					6.1
5.0	5.3	5.3	0.38	.042	9.0		0.4		1.56			6.1
4.8	5.1	5.1	0.27	.035	7.7		0.4					7.5
4.7	5.0	5.1	0.29	.033	8.8		0.3					10.2
4.6	5.0	5.0	0.27	.030	9.0		0.2					11.9
4.7	5.0	5.2	0.30	.028	10.7		0.3					13.2
4.8	5.2	5.4	0.28	.026	10.8		0.2		1.60			12.9
6.1	6.4	6.5	0.17				0.3					12.0
7.4	7.7	7.7	0.12				0.4					11.4
8.1	8.5	8.8	0.10				0.5	5				11.2
8.2	8.5	8.8	0.10				0.4	7	1.73			11.2
CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	5A1a	EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH <sub>4</sub> Ac EXCH.	SATURATION EXTRACT SOLUBLE 8A1				8A1 MOISTURE AT SATU- RATION %
		6N2b	6O2b	6H1a	6P2a	6Q2a		6P1a	6Q1a	6N1a	6O1a	
		Ca	Mg	H	Na	K		Na	K	Ca	Mg	
		milliequivalents per 100g. soil					5C1	milliequivalents per liter				
12.4	7.4	2.1	6.6	-	0.1	77		0.5	-	2.6	1.6	37.5
9.9	5.0	1.6	6.2	-	0.1	68		0.5	-	1.6	1.0	34.3
12.3	6.0	1.8	7.9	-	0.1	64		0.5	0.1	1.7	0.8	38.5
17.5	8.7	2.9	9.6	-	0.2	67		0.4	0.1	1.2	0.9	46.3
20.0	10.0	3.0	10.1	0.1	0.2	66		0.4	0.1	1.0	0.6	62.1
21.6	11.7	3.8	9.7	0.1	0.2	73		0.5	0.1	1.0	0.6	57.3
21.0	12.6	3.6	8.4	0.1	0.2	78		0.5	0.1	1.1	0.3	64.8
19.0	14.1	3.8	3.3	0.1	0.2	96		0.7	-	1.5	1.0	55.4
16.3	13.6	3.6	1.7	0.1	0.2			0.7	-	1.9	0.6	53.0
14.2		3.7	-	0.1	0.2			0.7	-	2.7	1.1	55.4
13.7		3.3	-	0.1	0.2			0.7	-	2.6	1.0	55.6

Soil type: \*Bonair loam  
 Soil No.: S56Iowa-45-12-(1-11)  
 Location: Approximately 1325 feet north and 1360 feet west of southeast corner of Sec. 33, T99N, R13W, Howard County, Iowa.  
 Vegetation or crop: Red clover and timothy seeding.  
 Parent material: Firm Iowan till with silty overburden.  
 Physiographic position: Ridge crest on upland about 1/2 mile from stream.  
 Topography: Gently sloping to undulating.  
 Slope: 3 percent.  
 Drainage: Moderately well drained.  
 Ground water: None observed within 60 inches.  
 Permeability: Very slow for the firm till and moderate for the overburden.  
 Moisture: Slightly moist.  
 Described by: L. E. Tyler, October 17, 1956.

Horizon and  
 Lincoln  
 Lab. Number

Ap 4954	0 to 5 inches. Very dark gray (10YR 3/1 moist) gritty silt loam; friable; moderate fine granular structure; some A2 mixed in Ap; boundary abrupt.
A21 4955	5 to 9 inches. Brown (10YR 5/3 moist) to light gray (10YR 7/2 dry) gritty silt loam; crushed color dark gray brown (10YR 4/2 moist); friable; weak very fine platy structure; boundary gradual.
A22 4956	9 to 12 inches. Gray brown to brown (10YR 5/2.5 moist) with common fine faint yellowish brown (10YR 5/4 moist) mottles; crushed color dark yellowish brown to yellowish brown (10YR 4.5/4 moist); heavy loam to light clay loam; friable to very slightly firm; moderate fine to very fine subangular blocky structure; boundary gradual.
B21 4957	12 to 15 inches. Ped surfaces gray brown to brown (10YR 5/2 to 5/3 moist); light gray (10YR 7/2 dry); ped interiors dark yellowish brown (10YR 4/4 moist) with few fine faint yellowish brown (10YR 5/4 moist) mottles; crushed color dark yellowish brown (10YR 4/6 moist); medium clay loam; moderately firm; strong fine subangular blocky structure; pebble band in this horizon and extending into the horizon directly above and the one below; boundary clear.
11B22 4958	15 to 19 inches. Block faces dark gray (N 4/0 moist) with many fine distinct dark brown to brown (7.5YR 4/4) mottles; prism faces principally gray (5Y 5/1 moist); ped interiors mixed, approximately 50 percent dark gray (N 4/0 moist) and 50 percent dark yellowish brown (10YR 4/4 moist); crushed color dark

prismatic structure breaking to strong fine to medium subangular blocky; dark color on peds that is so evident in the two horizons directly below is masked to quite an extent by light gray in this horizon; boundary gradual.

11B23 4959	19 to 23 inches. Prism faces gray (2.5Y 5/1 moist) with common medium distinct yellowish brown (10YR 5/4, moist) mottles; block faces very dark gray to dark gray (N 3/0 to 4/0 moist) with many medium distinct dark yellowish brown (10YR 4/4 moist) mottles; interiors mixed, approximately 60 percent strong brown (7.5YR 4/6 moist) and 40 percent dark gray (N 4/0 moist); crushed color yellowish brown to light olive brown (10YR 5/4 to 2.5Y 5/4 moist); medium clay loam; firm to very firm; moderate to strong medium prismatic structure breaking to moderate medium blocky; relatively dark ped surfaces in this horizon; boundary diffuse.
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SOIL SURVEY LABORATORY Lincoln, Nebr.

Dec. 17, 1957

SOIL TYPE Clarinda LOCATION Shelby County, Iowa  
silty claySOIL NOS. 853Iowa-83-4 LAB. NOS. 5389-5395

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			2A2 > 2 (9mm)	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002		

Soil type: Clarinda silty clay  
 Soil No.: S53Iowa-83-4  
 Location: Northwest corner of NW1/4 of NW1/4 of Sec. 1, T78N, R37W, Shelby County, Iowa.  
 Site: 9 percent slope.  
 Collected by and date: O. D. Friedrich, 1953.

Horizon and  
 Lincoln  
 Lab. Number

Ap 5389	0 to 6 inches. Very dark brown (10YR 2/2) light silty clay which contains some gray streaks; granular structure; abrupt boundary.
B1 5390	6 to 11 inches. Very dark grayish brown (10YR 3/2) gritty light silty clay with some darker ped coatings; very fine subangular blocky structure with weak vertical cleavage.
B2 5391	11 to 16 inches. Dark gray to dark grayish brown (10YR 4/1.5) gritty silty clay or clay; very fine subangular blocky structure with coarse vertical cleavage; few dark-colored and yellowish red oxide concretions; dark coatings on some peds; crushed color dark grayish brown (10YR 4/2).
B3 5392	16 to 23 inches. Dark grayish brown (2.5Y 4/2) gritty silty clay or clay with very fine subangular blocky structure with coarse strong vertical cleavage; numerous fine dark oxide concretions and few fine yellowish red concretions; glossy coatings on peds.
C1 5393	23 to 33 inches. Grayish brown (2.5Y 5/2) gritty silty clay with weak very fine subangular blocky structure approaching massive; common distinct strong brown (7.5YR 5/6) and black (10YR 2/1) mottles; some dark oxide concretions.
C2 5394	33 to 40 inches. Similar to layer above.
C3 5395	40 to 46 inches. Mottled strong brown (7.5YR 5/6) and grayish brown (2.5Y 5/2) silty clay to clay loam; very slightly calcareous.



SOIL SURVEY LABORATORY Lincoln, Nebr.

Dec. 17, 1957

SOIL TYPE Clarinda LOCATION Shelby County, Iowa  
silty clay loamSOIL NOS. S55Iowa-83-1LAB. NOS. 5352-5359

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	< 19mm	
0-4	Ap	0.2	0.5	0.7	1.9	2.4	52.9	41.4	32.7	23.6	-	sic
4-7	B21	0.2	0.6	0.8	2.4	2.8	47.4	45.8	29.8	21.8	-	sic
7-11	B22	0.5	1.0	1.3	3.6	3.3	43.2	47.1	27.2	21.3	-	sic
11-17	B23	0.5	1.7	1.9	4.9	4.0	40.9	46.1	26.4	21.1	-	sic
17-23	B24	1.0	2.3	2.4	6.3	5.1	38.9	44.0	27.8	19.6	-	c
23-31	B25	1.2	2.3	2.8	7.3	5.9	37.3	43.2	28.4	18.7	Tr.	c
31-42	B26	1.8	3.4	1.2	9.0	7.4	25.8	28.4	20.0	17.7	Tr.	c

Soil type: Clarinda silty clay loam

Soil No.: 855Iowa-83-1

Location: 200 feet north and 180 feet east of southwest corner of SE1/4 of SE1/4 of Sec. 16, Monroe Township, T78N, R38W, Shelby County, Iowa.

Slope: North-facing.

Collected by and date: W. Jury, R. Prill, and J. Phillips, September 1955.

# Horizon and

## Lincoln

### Lab. Number

Ap 5352	0 to 4 inches. Dark gray (10YR 4/1) silty clay loam with weak subangular blocky structure; friable to firm; some mixing of loess from slope above.
B21 5353	4 to 7 inches. Grayish brown (2.5Y 5/2) silty clay with numerous root channels of dark grayish brown (10YR 4/2) silty clay; massive with tendency to very weak subangular blocky structure; plastic; numerous roots; very few quartz pebbles; boundary clear.
B22 5354	7 to 11 inches. Grayish brown (2.5Y 5/2) silty clay with a few root channels of very dark grayish brown (10YR 3/2); a very few faint olive yellow (2.5Y 6/6) mottles; massive with tendency to very weak subangular blocky structure; plastic; very few iron-manganese fine concretions; very few quartz pebbles; boundary very diffuse.
B23 5355	11 to 17 inches. Grayish brown (2.5Y 5/2) clay with few cracks and root channels of very dark grayish brown (10YR 3/2); a few faint olive yellow (2.5Y 6/6) mottles; massive; plastic; a few iron-manganese concretions; few fine quartz pebbles; boundary diffuse.
B24 5356	17 to 23 inches. Same as previous horizon except very few root channels present.
B25 5357	23 to 31 inches. Grayish brown (2.5Y 5/2) clay with cracks and root channels of very dark grayish brown (10YR 3/2); a few faint olive yellow (2.5Y 6/6) mottles; plastic; few iron-manganese concretions; few to common quartz pebbles.
B26 5358	31 to 42 inches. Grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/6) clay loam with very dark gray (5Y 3/1) clay skins in seams; massive; very firm; few fine roots present; boundary clear.
B31 5359	42 to 60 inches. Strong brown (7.5YR 5/6) light clay loam with common grayish brown (2.5Y 5/2) clay skins in seams; massive; numerous, medium iron-manganese concretions; very firm; calcareous; numerous pockets of calcium carbonates; boundary diffuse.

Note: Colors are for the moist condition.

SOIL SURVEY LABORATORY  
Beltsville, Maryland

LOCATION Washington County, Iowa

SOIL TYPE Clinton silt loam

LAB NOS. D3875-D3893

Project and  
Field Nos. Z-1-2-8-(245-254)

LABORATORY NUMBER	DEPTH INCHES	HORIZON A	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
			1B1b		2A1								
			VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY ≤ 0.002	INTERNATIONAL		2A2 ≥ 2	
										II 0.2-0.02	III 0.02-0.002		
D3875	0-10	Ap	0.1	0.2	0.2	0.5	2.2	78.3	18.5	41.1	39.7	Tr.	
D3876	10-13	A2	0.0	0.2	0.2	0.4	1.7	74.4	23.1	36.1	40.3	0	
D3877	13-16	B1	0.0	0.2	0.2	0.3	1.4	68.3	29.6	32.3	37.6	0	
D3878	16-19	B21	0.0	0.1	0.1	0.2	1.1	63.9	34.6	28.3	36.8	0	
D3879	19-22	B22	0.0	0.1	0.1	0.2	1.0	61.2	37.4	27.0	35.4	0	
D3880	22-25	B22	0.0	0.1	0.1	0.2	0.9	60.7	38.0	26.8	35.0	0	
D3881	25-28	B22	0.0	0.0	0.1	0.2	0.9	61.1	37.7	27.4	34.7	0	
D3882	28-30	B23	0.0	0.0	0.1	0.2	1.0	62.2	36.5	29.3	34.0	0	
D3883	30-33	B23	0.0	0.1	0.1	0.2	1.1	61.5	37.0	29.9	32.9	0	
D3884	33-36	B31	0.0	0.0	0.1	0.2	1.1	63.5	35.1	30.9	33.8	0	
D3885	36-39	B31	0.0	0.0	0.1	0.2	1.3	63.9	34.5	31.6	33.7	0	
D3886	39-42	B31	0.0	0.0	0.1	0.1	1.3	65.0	33.5	30.6	35.8	0	
D3887	42-45	B32	0.0	0.0	0.1	0.2	1.3	66.3	32.1	32.6	35.1	0	
D3888	45-48	B32	0.0	0.0	0.1	0.2	1.5	66.7	31.5	34.2	34.1	0	
D3889	48-52	B32	0.0	0.0	0.1	0.2	1.6	68.1	30.0	36.3	33.5	0	
D3890	52-56	B33	0.0	0.0	0.1	0.2	1.3	69.3	29.1	35.6	35.1	0	
D3891	56-60	B33	0.0	0.1	0.1	0.3	1.0	69.4	29.1	31.7	38.9	0	
D3892	60-65	B33	0.0	0.1	0.2	0.3	0.8	70.2	28.4	28.4	42.8	0	
D3893	65-70	B33	0.0	0.1	0.2	0.5	0.7	70.7	27.8	26.5	45.1	0	
pH			ORGANIC MATTER				FREE IRON OXIDE Fe <sub>2</sub> O <sub>3</sub>			MOISTURE RETAINED AT			
8C1a H <sub>2</sub> O 1:1			6A3a Organic Matter %		NITROGEN %	C/N	%			BULK DENSITY g/cc	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
D3875	6.2			1.7									
D3876	5.9			1.0									
D3877	5.6			0.6									
D3878	5.4			0.4									
D3879	5.1			0.1									
D3880	5.0			0.5									
D3881	4.9			0.5									
D3882	4.9			0.5									
D3883	4.9			0.4									
D3884	4.9			0.4									
D3885	4.9			0.4									
D3886	5.0			0.4									
D3887	5.0			0.3									
D3888	5.1			0.2									
D3889	5.2			0.2									
D3890	5.3			0.2									
D3891	5.5			0.2									
D3892	5.6			0.0									
D3893	5.7			0.2									
CATION EXCHANGE CAPACITY (SUM)			EXTRACTABLE CATIONS 5B2					BASE SATURATION % (SUM)					
			6N4a Ca	604a Mg	Na	K	6H3a H						
			milliequivalents per 100g soil										
D3875		7.4	2.3				4.2						
D3876		7.3	3.2				4.9						
D3877		9.6	5.1				5.1						
D3878													
D3879		11.3	7.0				7.8						
D3880		10.8	7.1				8.8						
D3881		10.7	7.2				9.5						
D3882		10.6	7.4				9.1						
D3883		10.9	7.6				9.4						
D3884		10.6	7.3				8.7						
D3885													
D3886		11.1	7.8				7.0						
D3887													
D3888		10.9	7.8				5.5						
D3889													
D3890		10.9	7.6				4.3						
D3891		11.9	7.4				2.9						
D3892													
D3893		11.7	8.0				2.7						

a. Horizonation nomenclature added in 1965 by R. I. Dideriksen.

Soil type: Clinton silt loam

Location: SW corner SE1/4 SW1/4 Sec. 11, T74N, R8W, Washington County, Iowa. Sample taken on east side of fence on divide between two large drainage ways about 240 feet north of east-west blacktop road on east side of fence row in bluegrass sod at edge of clover field. Slope: 5.5 percent. Apparently loess to 70 inches, silty material with sand from 70 to 100 and compact clayey material with small pebbles 110 to 120.

Sampled by: R. J. Muckenhirn, F. F. Riecken, L. T. Alexander, and A. M. O'Neal, October 5, 1944.

Horizon and Beltsville Lab. Number

Ap	0 to 10 inches. Weak brown silt loam; fine granular structure; faintly platy in lower part; aggregates crushing easily without color change; worm casts and fibrous roots abundant.
D3875	
A2	10 to 13 inches. Moderate yellowish brown silt loam; very fine granular structure; aggregates crushing easily to dark to moderate yellowish brown; worm casts abundant, particularly in upper half of layer, many consisting of weak brown material from above; roots abundant.
D3876	
B1	13 to 16 inches. Moderate yellowish brown heavy silt loam; medium granular to fine nut structure; aggregates slightly vesicular, lightly sprinkled with gray, crushing easily without color change, penetrated by fibrous roots; worm casts and roots abundant.
D3877	
B21	16 to 19 inches. Moderate to dark yellowish brown silty clay; fine blocky structure; aggregates slightly vesicular, very angular and firm, sprinkled with gray and occasional dark brown specks, and crushing with strong resistance to moderate yellowish brown; few worm burrows, roots fairly abundant.
D3878	
B22	19 to 22 inches. Same as 16- to 19-inch layer except that aggregates are somewhat larger.
D3879	
B22	22 to 25 inches. Moderate yellowish brown silty clay; medium blocky structure; aggregates slightly vesicular, angular, thinly coated with gray, occasionally spotted with black, and crushing with strong resistance without color change to plastic silty clay; worm burrows fairly abundant, roots abundant.
D3880	
B22	25 to 28 inches. Dark yellowish brown silty clay; medium to coarse blocky structure; aggregates slightly vesicular, well coated with gray, specked with dark brown and black, and crushing with moderate difficulty to moderate yellowish brown; few worm casts and roots.
D3881	
B23	28 to 30 inches. Same as 25- to 28-inch layer except that blocks are coarser.
D3882	
B23	30 to 33 inches. Dark yellowish brown heavy silty clay loam or silty clay; coarse blocky structure, coarser than in 28- to 30-inch layer; aggregates slightly vesicular, some coated with gray, all crushing with moderate resistance to moderate yellowish brown; a few worm casts and a few roots in crevices.
D3883	
B31	33 to 36 inches. Moderate to dark yellowish brown heavy silty clay loam; coarse blocky structure; aggregates slightly vesicular, specked with brown and black, and crushing with moderate resistance to moderate yellowish brown; a few roots in crevices.
D3884	
B31	36 to 39 inches. Dark to moderate yellowish brown silty clay loam; otherwise same as 33- to 36-inch layer.
D3885	
B31	39 to 42 inches. Dark yellowish brown silty clay loam; coarse blocky structure; aggregates coarser than in 33- to 36-inch layer and some gray-coated; otherwise the same.
D3886	
B32	42 to 45 inches. Moderate yellowish brown silty clay loam; coarse blocky structure; aggregates slightly vesicular, irregularly sprinkled with gray, specked and mottled with black, and crushing with slight
D3887	

# SOIL SURVEY LABORATORY

Beltsville, Maryland

LOCATION Washington County, Iowa

SOIL TYPE Clinton silt loam

LAB NOS. D3894-D3913

Project and

Field Nos. 2-1-2-8-(264-273)

LABORATORY NUMBER	DEPTH INCHES	HORIZON  A	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										TEXTURAL CLASS
			1B1b VERY COARSE SAND 2-1	2A2						3A1		2A2 >> 2	
				COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY ≤ 0.002	INTERNATIONAL			
										II 0.2-0.02	III 0.02-0.002		
D3894	0-5	A1	0.0	0.4	0.6	1.0	1.9	77.1	19.0	36.9	42.7	Tr.	
D3895	5-9	A2	0.0	0.3	0.4	0.6	1.5	77.4	19.8	34.8	44.5	0	
D3896	9-12	A2	0.0	0.2	0.3	0.6	1.5	75.3	22.1	33.6	43.6	Tr.	
D3897	12-15	A3	0.0	0.2	0.3	0.5	1.3	72.0	25.7	32.0	41.6	0	
D3898	15-18	B1	0.0	0.2	0.3	0.4	1.3	68.3	29.5	30.1	39.8	0	
D3899	18-21	B21	0.0	0.1	0.2	0.4	1.1	64.9	33.3	28.3	38.0	0	
D3900	21-24	B22	0.0	0.1	0.2	0.3	1.2	60.7	37.5	26.8	35.2	0	
D3901	24-27	B22	0.0	0.1	0.1	0.3	1.0	60.7	37.8	26.6	35.3	0	
D3902	27-30	B22	0.0	0.1	0.1	0.3	1.1	61.0	37.4	27.2	35.1	0	
D3903	30-33	B23	0.0	0.0	0.1	0.3	1.1	61.9	36.6	29.0	34.1	0	
D3904	33-35	B23	0.0	0.0	0.1	0.3	1.3	62.5	35.8	28.9	35.0	0	
D3905	35-37	B23	0.0	0.0	0.1	0.3	1.5	62.7	35.4	29.1	35.2	0	
D3906	37-40	B31	0.0	0.0	0.1	0.2	1.3	63.4	35.0	31.4	33.4	0	
D3907	40-43	B31	0.0	0.0	0.1	0.3	1.7	63.4	34.5	33.0	32.3	0	
D3908	43-46	B31	0.0	0.0	0.1	0.2	1.5	65.2	33.0	33.9	33.0	0	
D3909	46-49	B32	0.0	0.0	0.1	0.2	1.8	66.3	31.6	33.8	34.4	0	
D3910	49-53	B32	0.0	0.0	0.1	0.2	1.7	66.4	31.6	34.7	33.5	0	
D3911	53-57	B33	0.1	0.3	0.3	1.0	3.6	66.6	28.1	39.0	31.8	0	
D3912	57-63	B33	0.0	0.0	0.0	0.3	2.0	68.9	28.8	36.0	35.0	0	
D3913	63-70	B33	0.0	0.0	0.0	0.3	2.5	69.0	28.2	35.8	35.8	0	
pH			ORGANIC MATTER				FREE IRON OXIDE Fe <sub>2</sub> O <sub>3</sub> %			MOISTURE RETAINED AT			
8C1a H <sub>2</sub> O 1:1			6A3a Organic Matter %							BULK DENSITY g/cc	1/10 ATMOS %	1/3 ATMOS %	15 ATMOS. %
D3894	6.9			2.8									
D3895	5.9			1.7									
D3896	5.8			0.9									
D3897	5.9			0.6									
D3898	5.6			0.5									
D3899	5.4			0.5									
D3900	5.2			0.5									
D3901	5.1			0.4									
D3902	5.1			0.3									
D3903	5.2			0.3									
D3904	5.2			0.4									
D3905	5.3			0.4									
D3906	5.3			0.3									
D3907	5.3			0.3									
D3908	5.4			0.1									
D3909	5.4			0.1									
D3910	5.5			0.1									
D3911	5.5			0.1									
D3912	5.6			0.2									
D3913	5.6			0.1									
CATION EXCHANGE CAPACITY (SUM)			EXTRACTABLE CATIONS 5B2				BASE SATURATION % (SUM)						
			6N4a Ca	6O4a Mg	Na	K	6H3a H						
			milliequivalents per 100g soil										
D3894			8.9	1.9			3.8						
D3895			5.9	2.0			5.2						
D3896			5.9	2.3			5.3						
D3897													
D3898			8.4	4.6			5.2						
D3899													
D3900			10.9	6.7			8.2						
D3901			11.8	7.2			8.2						
D3902													
D3903			12.5	7.8			7.7						
D3904													
D3905			12.4	7.7			7.0						
D3906													
D3907			12.8	7.7			6.2						
D3908													
D3909													
D3910			12.6	7.7			5.2						
D3911			11.6	7.0			4.7						
D3912			11.6	7.1			4.5						
D3913			10.9	6.8			4.2						

a. Horizonation nomenclature added in 1965 by R. I. Mderiksen.

Soil type: Clinton silt loam

Location: SW1/4 NW1/4 SW1/4 Sec. 9, T77N, R7W, Washington County, Iowa. Sample taken in bluegrass pasture about 15 feet from fence on east side of gravel road, 7 rods north of north gatepost of Kaloma golf course.

Slope: 7 percent.

Sampled by: R. J. Muckenhirn, F. F. Riecken, L. T. Alexander, and A. M. O'Neal, October 5, 1944.

Horizon and Beltsville Lab. Number

A1 D3894	0 to 5 inches. Light brownish gray silt loam; fine granular structure; fibrous roots abundant.
A2 D3895	5 to 9 inches. Mixed light brownish gray and moderate yellowish brown silt loam; weakly developed fine platy structure; roots abundant.
A2 D3896	9 to 12 inches. Moderate yellowish brown silt loam; medium granular structure; fibrous roots fairly abundant.
A3 D3897	12 to 15 inches. Moderate yellowish brown silt loam; medium nut structure; aggregates lightly sprinkled with gray, crushing easily.
B1 D3898	15 to 18 inches. Moderate yellowish brown heavy silt loam; medium nut structure.
B21 D3899	18 to 21 inches. Moderate yellowish brown light silty clay loam; medium blocky structure; aggregates angular, lightly coated with gray.
B22 D3900	21 to 24 inches. Moderate brown to dark yellowish brown silty clay loam; medium blocky structure.
B22 D3901	24 to 27 inches. Same as 21- to 24-inch layer except that blocks are slightly larger.
B22 D3902	27 to 30 inches. Moderate yellowish brown heavy silty clay loam; medium blocky structure.
B23 D3903	30 to 33 inches. Moderate yellowish brown silty clay loam; medium blocky structure.
B23 D3904	33 to 35 inches. Dark to moderate yellowish brown silty clay loam; coarse blocky structure; aggregates slightly to moderately resistant to crushing.
B23 D3905	35 to 37 inches. Dark yellowish brown silty clay loam; coarse blocky structure; aggregates slightly resistant to crushing.
B31 D3906	37 to 40 inches. Dark to moderate yellowish brown silty clay loam; coarse blocky structure.
B31 D3907	40 to 43 inches. Moderate yellowish brown silty clay loam; coarse blocky structure; specked with brown and black and with a little gray mottling.
B31 D3908	43 to 46 inches. Moderate yellowish brown silty clay loam; very coarse blocky structure.
B32 D3909	46 to 49 inches. Light to moderate yellowish brown light silty clay loam; slightly mottled with brown and gray.
B32 D3910	49 to 53 inches. Moderate yellowish brown heavy silt loam; coarse blocky structure, mottled with gray and strong brown.
B33 D3911	53 to 57 inches. Same as 49- to 53-inch layer except that coarse blocky aggregates are weakly developed.
B33 D3912	57 to 63 inches. Moderate yellowish brown silt loam; coarse blocky structure, mottled with strong brown and gray.
B33 D3913	63 to 70 inches. Same as 57- to 63-inch layer.

Note: Horizonation nomenclature added in 1965 by R. I. Dideriksen.

## SOIL SURVEY LABORATORY Lincoln, Nebr.

1/24/58

SOIL TYPE Clyde

LOCATION

Howard County, Iowa

silt loam

SOIL NOS.

S56Iowa-45-4-(1-9)

LAB. NOS.

4874-4882

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1							2A2		
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002 (19mm)	> 2	
0-7	A1p	0.2	1.0	1.2	3.7	3.1	54.7	36.1	25.8	34.1	-	sic1
7-12	A12	0.8	2.6	2.8	6.0	5.2	50.6	32.0	26.8	32.7	-	sic1
12-16	A13	1.3	4.0	3.9	8.7	9.9	44.8	27.4	32.1	28.4	1	cl
16-20	IB11g	2.0	7.6	7.4	13.5	12.1	36.4	21.0	36.2	20.5	6	l
20-25	IB12g	3.4	6.5	6.3	9.9	6.1	42.4	25.4	28.3	25.7	6	l
25-30	IB2g	2.1	3.1	2.7	3.9	2.7	54.4	31.1	25.9	33.3	7	sic1
30-37	IC1g	1.1	1.2	1.0	2.7	4.2	61.1	28.7	33.9	33.3		sic1
37-44	IIIC2g	7.9	16.1	16.0	24.5	8.4	16.5	10.6	29.7	7.1	22	sl
44-55	IIIC3g	9.9	19.2	22.0	28.0	6.2	9.3	5.4	24.2	4.2	24	lcos
pH 8C1a		ORGANIC MATTER				EST% SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM	6E1a	MOISTURE TENSIONS			
1:1	1:5	1:10	6A1a ORGANIC CARBON %	6B1a NITRO- GEN %	C/N		8A1a	CaCO <sub>3</sub> equiv- alent %	4B2 15 ATMOS. %			
6.0	6.4	6.5	7.40	.601	12.3		0.5		23.6			
6.1	6.4	6.5	6.78	.589	11.5		0.5		23.0			
5.9	6.3	6.4	6.31	.561	11.2		0.6		22.0			
6.4	6.7	6.7	1.19	.109	10.9		0.5		9.9			
6.6	6.8	6.9	0.62	.059	10.5		0.4		10.8			
6.6	6.9	7.0	0.36				0.4		13.4			
6.7	7.2	7.2	0.26				0.3	-	12.8			
6.7	7.2	7.2	0.09				0.5	-	4.5			
7.0	7.2	7.2	0.04				0.5	-	2.6			
5A1a CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH <sub>4</sub> Ac EXCH. 5C1	SATURATION EXTRACT SOLUBLE 8A1				8A	
6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	6P1a Na		6Q1a K	6N1a Ca	6O1a Mg	MOISTURE AT SATU- RATION %		
milliequivalents per 100g. soil					milliequivalents per liter							
45.7	34.9	7.5	14.1	0.1	0.4	94	0.4	-	2.3	1.8	81.2	
44.9	34.4	6.9	13.3	0.1	0.2	93	0.4	-	2.7	2.1	80.8	
40.3	31.5	6.2	12.8	0.1	0.2	94	0.4	-	3.3	2.2	78.7	
22.1	17.4	4.3	4.1	0.1	0.2		0.4	-	2.0	1.9	43.2	
22.6	17.7	4.9	3.3	0.1	0.2		0.4	-	1.1	2.1	47.3	
25.5	19.7	6.0	3.3	0.1	0.2		0.4	-	2.1	1.3	61.9	
23.5	20.6	5.4	2.9	0.1	0.3		0.4	-	1.9	0.9	62.3	
7.0	5.2	1.4	1.6	-	0.1		0.6	-	2.5	1.4	26.2	
4.5	3.3	0.9	1.2	-	0.1		0.6	0.1	2.5	1.4	24.2	

Soil type: Clyde silt loam  
 Soil No.: S56Iowa-45-4-(1-9)  
 Location: Approximately 630 feet south and 65 feet east of northwest corner of NE1/4 of Sec. 9, T99N, R13W, Howard County, Iowa.  
 Vegetation or crop: Red clover meadow.  
 Parent material: Silty overburden over glacial valley fill of Iowan age.  
 Physiographic position: Low, wide upland drainage way, nearly level from side to side.  
 Topography: Nearly level.  
 Slope: 0 to 1 percent.  
 Drainage: Poor.  
 Ground water: At 55 inches due to long period of dry weather.  
 Permeability: Moderate except in horizons of sand and gravel where it becomes rapid.  
 Moisture: Moist.  
 Stoniness: Silty overburden (0 to 16 inches) free of pebbles, clay loam drift (16 to 37 inches plus) contains some pebbles or small rocks, sandy and gravelly area (37 to 55 inches) contains many pebbles and rocks.  
 Described by: L. E. Tyler, October 11, 1956.

Horizon and  
 Lincoln  
 Lab. Number

Alp 4874	0 to 7 inches. Black (N 2/0 moist) heavy silt loam or loam; friable; weak very fine granular structure; boundary clear.
Al2 4875	7 to 12 inches. Black (N 2/0 moist) with few fine faint very dark brown (10YR 2/2 moist) organic mottles; heavy silt loam to loam; friable; weak fine granular structure; boundary gradual.
Al3 4876	12 to 16 inches. Black (N 2/0 moist) with common fine prominent dark reddish brown (2.5YR 3/4) mottles around small roots; heavy silt loam or loam; friable; weak fine subangular blocky structure; boundary clear.
IIB1lg 4877	16 to 20 inches. Black to very dark gray (N 2.5/0 moist) light clay loam; crushed color black (2.5Y 2.5/1 moist); slightly firm; weak medium platy structure breaking to fine granular; boundary gradual.
IIB12g 4878	20 to 25 inches. This horizon appears to be mechanically mixed; colors are very dark gray to gray (2.5Y 3.5/1 moist) and black to very dark gray (N 2.5/0 moist); crushed color is very dark gray to gray; light clay loam; slightly firm; weak very fine granular structure; boundary clear.
IIB2g 4879	25 to 30 inches. Dark gray brown to gray brown (2.5Y 4.5/2 moist) with few fine distinct olive brown (2.5Y 4/4 moist) mottles; crushed color olive brown to light olive brown (2.5Y 4.5/3 moist); light silty clay loam; slightly firm; weak very fine subangular blocky structure; contains some pebbles 1 to 2 inches in diameter; boundary gradual.
IIC1g 4880	30 to 37 inches. Gray brown (2.5Y 5/2 moist) with many fine distinct yellowish brown (10YR 5/6 moist) mottles; crushed color light olive brown (2.5Y 5/4 moist); heavy silt loam; friable; weak very fine subangular blocky structure; boundary gradual.
IIC2g 4881	37 to 44 inches. Gray brown (2.5Y 5/2 moist) with many medium distinct dark yellowish brown (10YR 4/6 moist) mottles; crushed color light olive brown (2.5Y 5/5 moist); heavy loam except has small sand lenses or pockets; slightly firm; contains many pebbles 1/2 to 1-1/2 inches in diameter; boundary diffuse.
IIC3g 4882	44 to 55 inches. Gray (5Y 5/1 moist) sand and gravel; loose single grain; contains scattered pebbles up to 2 inches in diameter; entire profile leached.

Notes: Sand and gravel lenses are often present in this drainage way or valley fill position. The material apparently becomes progressively thinner and then disappears as one follows a waterway to the watershed crest.



SOIL TYPE Clyde LOCATION Howard County, Iowa  
 silt loam

SOIL NOS. S56Iowa-45-10-(1-9) LAB. NOS. 4935-4943

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in n.m.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
		2.1	1.0-5	0.50-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.001	< 0.001	
0-6	A1p	0.8	6.2	6.0	7.9	3.0	46.5	29.6	25.1	27.6	-	cl
6-10	A12	1.0	4.8	5.0	7.6	3.2	48.6	29.8	26.4	28.6	-	cl
10-15	A13	1.0	3.4	3.4	5.2	2.2	51.5	33.3	25.3	30.6	-	sicl
15-19	A3g	1.7	2.1	1.9	2.3	1.1	58.4	32.5	24.0	36.7	-	sicl
19-27	B2g(?)	1.7	2.5	2.1	2.9	1.9	60.8	28.1	30.1	34.1	-	sicl
27-33	IC1g(?)	5.0	9.7	10.2	15.5	9.0	31.4	19.2	33.8	15.0	4	l
33-44	IC2g(?)	4.7	10.3	10.5	15.8	9.2	30.7	18.8	33.4	15.2	4	l
44-51	IC3g(?)	5.9	10.2	11.0	17.2	10.1	28.2	17.4	34.2	13.6	3	fsl
51-60	IC4g(?)	6.9	9.9	9.4	16.7	9.3	31.1	16.7	32.8	15.4	5	fsl
pH 8C1a		ORGANIC MATTER				ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMOS DEP. CM		6E1a	MOISTURE TENSIONS			4B2
		1:5	1:10	ORGANIC CARBON	NITRO- GEN	C/N		CoCO <sub>3</sub> equiv- alent				15 ATMOS.
				%	%		8A1a	%				%
6.8	7.1	7.2	5.99	.504	11.9		0.7					19.7
7.0	7.2	7.4	4.61	.407	11.3		0.5					18.5
7.2	7.5	7.5	1.33	.120	11.1		0.4					14.6
7.3	7.6	7.7	0.64	.065	9.8		0.3					13.7
7.3	7.7	7.8	0.32	.029	11.0		0.4					12.4
7.7	7.9	7.9	0.13				0.4					7.8
7.8	8.0	8.0	0.09				0.4					7.8
8.3	8.7	8.8	0.05				0.5	3				7.3
8.3	8.7	9.0	0.06				0.4	11				6.6
5A1a		EXTRACTABLE CATIONS				5B1a	BASE SAT. NI Ac EXCH.	SATURATION EXTRACT SOLUBLE 8A1				8A
CATION EXCHANGE CAPACITY	6N2b	6O2b	6H1a	6P2a	6Q2a			6P1a	6Q1a	6N1a	6O1a	MOISTURE AT SATU- RATION
	Ca	Mg	H	Na	K			Na	K	Ca	Mg	%
milliequivalents per 100g. soil												
NH <sub>4</sub> Ac								milliequivalents per liter				
41.4	34.5	6.5	7.6	0.2	0.3			0.5	-	1.7	1.6	73.1
39.9	34.4	5.9	6.7	0.2	0.3			0.4	-	3.8	1.2	66.1
32.2	27.7	5.7	4.2	0.1	0.3			0.4	-	2.5	1.0	55.4
28.7	24.0	5.5	2.6	0.1	0.1			0.3	-	2.0	0.6	61.8
24.2	20.3	5.3	1.7	0.1	0.2			0.4	-	2.4	1.0	60.1
11.5	9.8	2.2	2.1	-	0.1			0.4	-	2.0	1.2	40.2
11.0	9.2	2.4	1.2	-	0.2			0.4	-	2.3	1.2	40.6
8.6		2.2	-	-	0.1			0.4	-	3.1	1.3	37.8
7.9		1.8	-	-	0.2			0.4	0.1	2.7	0.8	37.3

Soil type: Clyde silt loam  
 Soil No.: 856Iowa-45-10-(1-9)  
 Location: Approximately 815 feet east and 85 feet north of southwest corner of NW1/4 of Sec. 35, T99N, R13W, Howard County, Iowa.  
 Vegetation or crop: Timothy meadow.  
 Parent material: Silty overburden over glacial valley fill of Iowan age.  
 Physiographic position: Low, wide upland drainage way, nearly level from side to side.  
 Topography: Gently sloping to undulating.  
 Slope: 0 to 1 percent.  
 Drainage: Poor.  
 Ground water: At approximately 60 inches.  
 Permeability: Moderate to moderately slow.  
 Moisture: Moist.  
 Described by: I. E. Taylor October 16 1956.

Horizon and  
 Lincoln  
 Lab. Number

A1p 0 to 6 inches. Black (N 2/0 moist) silt loam; friable; moderate fine granular structure; boundary clear.  
 4935

A12 6 to 10 inches. Black (N 2/0 moist) silt loam with high organic matter content; very friable; weak fine granular structure; boundary clear.  
 4936

A13 10 to 15 inches. Black to very dark gray (N 2.5/0 moist) light silty clay loam; crushed color black (10YR 2/1 to 2.5Y 2/1 moist); friable to very slightly firm; weak very fine granular structure; boundary gradual.  
 4937

A3e 15 to 19 inches. Very dark gray (2.5Y 3/1 moist) light to medium silty clay loam; friable to very slightly firm; weak fine granular to weak very fine subangular blocky structure; boundary gradual.  
 4938

B2g(?) 19 to 27 inches. Olive gray (5Y 5/2 moist) with common fine faint olive brown (2.5Y 4/4 moist) mottles; crushed color olive gray (5Y 5/2 moist); heavy silt loam to light silty clay loam; friable to slightly firm; very weak and very fine subangular blocky structure; boundary clear but wavy.  
 4939

IIc1g(?) 27 to 33 inches. Mixed colors, approximately 45 percent gray (5Y 5/1 moist) and 55 percent dark yellowish brown to yellowish brown (10YR 4/6, 5/6, 5/8 moist). Crushed color yellowish brown (10YR 5/4 moist); medium loam to sandy clay loam; friable; weak very fine subangular blocky to massive; boundary diffuse.  
 4940

IIc2g(?) 33 to 44 inches. Mixed gray (5Y 5/1 moist) and strong brown (7.5YR 5/8 moist) medium loam to sandy clay loam; crushed color yellowish brown (10YR 5/6 moist); friable; very weak and very fine subangular blocky to massive. This horizon and those above are leached; boundary clear but wavy.  
 4941

IIc3g(?) 44 to 51 inches. Mixed colors, approximately 50 percent gray to light gray (5Y 6/1 moist) and 50 percent dark yellowish brown to yellowish brown (10YR 4/4 to 5/6 moist); crushed color yellowish brown (10YR 5/5 moist); medium loam; friable; massive. This horizon and those below are unleached; boundary diffuse.  
 4942

IIc4g(?) 51 to 60 inches. Mixed colors, approximately 50 percent yellowish brown (10YR 5/6 moist) and 50 percent gray to light gray (5Y 6/1 moist); these colors occur individually in large spots, some 12 inches in diameter. Texture, consistence, and structure as in above horizon.  
 4943

Notes: No clay skins evident. Deoxidized conditions prevail around root channels. Pebble band sometimes present on the uppermost of the horizons designated with a Roman numeral II. Although the face described did not contain layers or pockets of coarse sand and gravel in the II material, some were observed in the side of the pit and this condition is common to the unit.

SOIL SURVEY LABORATORY Lincoln, Nebr. 1/24/58

SOIL TYPE \*Cresco loam LOCATION Howard County, Iowa

SOIL NOS. S56Iowa-45-1-(1-11) LAB. NOS. 4843-4853

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1R1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (19mm)	
0-7	Alp	1.1	6.8	7.2	9.0	3.4	45.9	26.6	26.0	26.8	-	1
7-10	Al2	0.8	5.1	6.0	8.0	3.4	48.3	28.4	26.4	28.5	-	cl
10-13	A3	1.1	5.6	5.8	8.1	3.8	47.6	28.0	26.5	28.1	-	cl
13-18	B1	1.6	5.4	6.7	9.7	5.9	41.6	29.1	28.3	24.5	Tr.	cl
18-22	IIB21	1.9	6.4	7.5	12.0	8.2	30.2	33.8	28.2	17.0	Tr.	cl
22-30	IIB22	1.7	6.1	7.1	12.0	9.2	29.4	34.5	29.2	16.4	Tr.	cl
30-40	IIB23	2.6	5.9	6.9	12.3	9.1	30.4	32.8	29.0	17.3	Tr.	cl
40-49	IIB3	2.4	6.3	7.2	12.5	9.5	30.5	31.6	29.8	17.4	4	cl
49-58	IIB3	4.0	6.2	6.5	11.3	9.0	31.5	31.5	29.0	18.1	3	cl
58-66	IIC1	3.0	6.5	6.5	12.6	9.2	30.9	31.3	28.8	17.5	2	cl
66-70	IIC2	2.9	6.0	6.5	11.5	9.2	33.1	30.8	29.8	19.1	4	cl
1:1	pH	8C1a		ORGANIC MATTER			EST% SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC-103 MILLIMOS PER CM 6A1a	4A3a		MOISTURE TENSIONS	
		1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N			Vol. Wt.		1B ATMOS.	
				%	%				g/cc		%	
5.3	5.5	5.7	3.23	.284	11.4			0.4			12.5	
5.1	5.4	5.5	2.64	.230	11.5			0.4			12.9	
5.0	5.3	5.4	1.61	.153	10.5			0.4	1.22		11.2	
4.9	5.3	5.4	0.93	.090	10.3			0.4			10.8	
4.9	5.3	5.4	0.54	.050	10.8			0.3			11.4	
4.9	5.4	5.5	0.36	.029	12.4			0.2	1.52		11.2	
5.3	5.9	5.9	0.27					0.3	1.66		11.0	
6.5	7.0	7.0	0.22					0.3			11.2	
7.6	7.7	7.9	0.20					0.3			11.7	
7.8	8.1	8.3	0.18					0.4	1.76		12.6	
7.9	8.5	8.7	0.19					0.4	5		12.5	
5A1a		EXTRACTABLE CATIONS 5B1a					BASE SAT. %	SATURATION EXTRACT SOLUBLE 8A1				8A MOISTURE
CATION		6N2b	6O2b	6H1a	6P2a	6Q2a		6P1a	6Q1a	6N1a	6O1a	

Soil type: \*Cresco loam  
 Soil No.: S56Iowa-45-1-(1-11)  
 Location: Approximately 590 feet east and 24 feet north of southwest corner SE1/4 of Sec. 15, T99N, R13W, Howard County, Iowa.  
 Vegetation or crop: Soybeans.  
 Parent material: Firm Iowan till with silty overburden.  
 Physiographic position: Crest of ridge on upland.  
 Topography: Gently sloping to undulating.  
 Slope: 2 to 3 percent.  
 Drainage: Moderately well drained.  
 Ground water: None observed within 70 inches. During wet periods there appears to be a perched water table above the firm till (22 inches in this profile).  
 Permeability: Very slow for the firm till and moderate for the overburden.  
 Moisture: Slightly moist.  
 Stoniness: Some pebbles occur through the firm till; a band of pebbles is concentrated just above the firm till and the silty material above this is usually pebble free.  
 Described by: L. E. Tyler, October 10, 1956.

Horizon and  
 Lincoln  
 Lab. Number

Alp 4843	0 to 7 inches. Black (10YR 2/1 moist) gritty silt loam; friable; moderate fine granular structure; boundary clear.
A12 4844	7 to 10 inches. Black (10YR 2/1 moist) gritty silt loam; crushed moist color 10YR 2.5/1; friable; moderate fine granular structure; boundary clear.
A3 4845	10 to 13 inches. Mixed colors, approximately 60 percent dark brown to brown (10YR 4/3 moist), 30 percent very dark gray brown (10YR 3/2 moist), and 10 percent black (10YR 2/1 moist) gritty silt loam or clay loam; crushed color very dark gray brown (10YR 3/2 moist); friable; weak, very fine subangular blocky and moderate fine granular structure; boundary clear.
B1 4846	13 to 18 inches. Dark brown or brown (10YR 4/3 moist) to olive brown (2.5Y 4/3 moist) light clay loam; friable to slightly firm; moderate very fine subangular blocky structure; pebble band enters lower part of this horizon; boundary gradual.
11B21 4847	18 to 22 inches. Olive brown (2.5Y 4/3 moist) light to medium clay loam; common fine distinct mottlings of strong brown (7.5YR 5/6 moist); slightly firm; moderate very fine subangular blocky structure; faint indication of clay skins; pebble band occurs in upper part of this horizon; boundary gradual.
11B22 4848	22 to 30 inches. Prominent continuous ped coatings of gray (5Y 5/1 moist) with some discontinuous coatings of very dark gray (10YR 3/1 moist) that appear to be illuviated clay; ped interiors are yellowish brown (10YR 5/6 moist) and strong brown (7.5YR 5/6 moist); crushed color is brown to yellowish brown (10YR 5/3 to 5/4 moist). Light to medium clay loam; firm; strong fine blocky structure; clay skins on all ped faces; boundary gradual.
11B23 4849	30 to 40 inches. Ped coatings and interiors as in horizon above except fewer very dark gray (10YR 3/1 moist) coatings; crushed color is olive brown (2.5Y 4/3 moist), medium clay loam; firm; moderate medium prismatic structure breaking to strong fine subangular blocky; clay skins on all ped faces; boundary gradual.
11B3 4850	40 to 49 inches. Distinct discontinuous gray (5Y 5/1 moist) ped coatings with common fine prominent strong brown (7.5YR 5/6 moist) mottles; strong brown (7.5YR 5/6 moist) ped interiors; crushed color olive brown (2.5Y 4/3 moist), medium clay loam; firm; moderate coarse prismatic structure breaking to moderate medium subangular blocky; continuous clay skins on vertical prism faces but discontinuous clay skins on subangular blocks; boundary gradual.
11B3 4851	49 to 58 inches. Colors as in above horizon although ped coatings appear to be thinner; medium clay loam; firm; weak coarse prismatic structure tending to break to weak medium subangular blocky; continuous coats on vertical prism faces but discontinuous coats on subangular blocks; boundary diffuse.
11C1 4852	58 to 66 inches. Gray (5Y 5/1 moist) and strong brown (7.5YR 5/6 moist) but olive brown (2.5Y 4/3 moist) when crushed; medium clay loam; firm; massive structure tending to break to weak medium subangular blocky; few discontinuous clay skins in old root channels; this horizon and all above horizons leached; boundary clear and wavy.
11C2 4853	66 to 70 inches. Mixed colors, approximately 60 percent olive brown (2.5Y 4/3 moist), 30 percent gray (5Y 5/1 moist), and 10 percent strong brown (7.5YR 5/6 moist); crushed color olive brown (2.5Y 4/3 moist); light clay loam; firm; massive structure; unleached; the thickness of leached soil is normally about 46 inches. Near more porous areas (sand cracks) the carbonate line dips.

Notes: In all firm till profiles, crevices filled with sand, ranging to sandy clay loam, were found in the firm till beneath the overburden. These crevices varied in width from 1 to 5 inches and sometimes widened into pockets. Although these were avoided on the face described, at least one was present in the area covered by each pit (2 by 5 feet). Prismatic structure described may not be evident under wet conditions. The soil was much drier than normal due to long period of dry weather. Textures are field estimates.

SOIL SURVEY LABORATORY Lincoln, Nebr. 1/27/58

SOIL TYPE \*Cresco loam LOCATION Howard County, Iowa

SOIL NOS. S56Iowa-45-9-(1-10) LAB. NOS. 4925-4934

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2 (9mm)	
		2.1	1.0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002		
0-7	A1p	1.6	7.8	9.8	11.6	4.6	40.3	24.3	27.4	23.1	-	1
7-12	A12	1.4	6.4	8.2	10.7	4.9	42.5	25.9	28.6	24.0	Tr.	1
12-16	AB	3.2	6.2	6.8	11.0	7.2	36.7	28.9	28.8	21.0	4	cl
16-20	B21	2.8	5.6	6.6	12.3	9.2	30.1	33.4	29.3	17.0	-	cl
20-25	B22	2.7	6.1	7.4	12.9	9.5	28.9	32.5	30.0	15.9	-	cl
25-33	IIB23	3.5	6.6	6.4	12.9	9.5	29.3	31.8	29.2	16.1	5	cl
33-43	IIB31	2.5	6.8	6.8	13.7	9.9	30.3	30.0	32.2	14.8	3	cl
43-49	IIB32	3.4	6.7	6.6	13.2	9.6	33.0	27.5	30.8	18.4	6	cl
49-60	IIC1	4.0	6.2	6.2	12.5	9.7	33.9	27.5	30.6	19.2	7	cl
60-70	IIC2	3.2	6.7	6.2	12.4	9.3	33.6	28.6	30.3	18.9	5	cl
pH 8C1a		ORGANIC MATTER					ELECTRI- CAL CONDUCT- IVITY EC-10 <sup>3</sup> MILLIMHOS PER CM 8A1a		6E1a	4A3a	MOISTURE TENSIONS	
			6A1a	6B1a								4B2
	1:5	1:10	ORGANIC CARBON	NITRO- GEN	C/N			CaCO <sub>3</sub> equiv- alent	Vol. Wt.			15 ATMOS.
	1:1		%	%				%	g/cc			%
5.5	5.9	6.0	3.27	.272	12.0		0.4					11.6
5.1	5.7	5.7	1.95	.161	12.1		0.4					11.2

Soil type: \*Cresco loam  
 Soil No.: S56Iowa-45-9-(1-10)  
 Location: Approximately 835 feet west and 15 feet north of southeast corner of NW1/4 of Sec. 35, T99N, R13W, Howard County, Iowa.  
 Vegetation or crop: Corn.  
 Parent material: Firm Iowan till with silty overburden.  
 Physiographic position: Crest of ridge on upland.  
 Topography: Gently sloping to undulating.  
 Slope: 3 percent.  
 Drainage: Moderately well drained.  
 Ground water: None observed within 70 inches.  
 Permeability: Very slow for the firm till and moderate for the overburden.  
 Moisture: Slightly moist.  
 Described by: L. E. Tyler, October 16, 1956.

Horizon and  
 Lincoln  
 Lab. Number

- Alp 0 to 7 inches. Black (10YR 2/1 moist) gritty silt loam; friable; moderate fine granular structure; evidence of much worm activity; boundary abrupt.
- 4925
- Al2 7 to 12 inches. Mixed colors, black to very dark gray (10YR 2.5/1 moist) and very dark gray brown to dark gray brown (10YR 3.5/2 moist); crushed color black to very dark gray (10YR 2.5/1 moist); gritty silt loam; friable; weak very fine subangular blocky and weak very fine granular structure; much worm activity; boundary gradual.
- 4926
- AB 12 to 16 inches. Mixed colors, approximately 50 percent very dark gray (10YR 3/1 moist) and 50 percent very dark gray brown to dark gray brown (10YR 3.5/2 moist); crushed color 10YR 3.5/2 moist to 2.5Y 3.5/2 moist; gritty silt loam; friable to slightly firm; weak very fine subangular blocky structure; part of pebble band in this horizon; boundary gradual.
- 4927
- B21 16 to 20 inches. Dark gray brown to brown (10YR 4/2.5 moist) with few fine faint yellowish brown (10YR 5/6 moist) mottles; crushed color yellowish brown to dark yellowish brown (10YR 4.5/4 moist); light clay loam; slightly firm; moderate very fine subangular blocky structure; pebble band in this horizon; boundary gradual.
- 4928
- B22 20 to 25 inches. Ped surfaces gray brown (2.5Y 5/2 moist) with common fine distinct yellowish brown to dark yellowish brown (10YR 4.5/4 moist) mottles; ped interiors are yellowish brown (10YR 5/5 moist) and crushed color is same; light to medium clay loam; moderately firm; moderate to strong, fine to very fine subangular blocky structure; boundary gradual.
- 4929
- IIB23 25 to 33 inches. Ped surfaces gray (5Y 5/1 moist) with common fine faint brown (10YR 5/3 moist) mottles; ped interiors mixed gray (5Y 5/1 moist) and dark yellowish brown (10YR 4/4 moist) with common fine distinct strong brown (7.5YR 5/6 moist) mottles; medium clay loam; firm; weak medium prismatic structure breaking to strong medium subangular blocky; large vertical faces present but difficult to pick out with a knife--quite noticeable when working with the spade; boundary diffuse.
- 4930
- IIB31 33 to 43 inches. Ped surfaces gray (5Y 5/1 moist) with common fine distinct yellowish brown (10YR 5/4 moist) mottles; ped interiors mixed gray (5Y 5/1 moist) and dark yellowish-brown to yellowish brown (10YR 4/4 to 5/6 moist); crushed color yellowish brown to light olive brown (10YR 5/4 to 2.5Y 5/4 moist); medium clay loam; firm to very firm; weak coarse prismatic structure breaking to moderate to weak coarse subangular blocky; this horizon and those above it leached; boundary clear.
- 4931
- IIB32 43 to 49 inches. Mixed colors, approximately 50 percent gray (5Y 5.5/1 moist) and 50 percent dark yellowish brown to yellowish brown (10YR 4/4 to 5/6 moist); some ped faces gray (5Y 5.5/1 moist); crushed color yellowish brown to light olive brown (10YR 5/4 to 2.5Y 5/4 moist); light to medium clay loam; firm; weak coarse prismatic structure breaking to weak coarse subangular blocky; this horizon and those below unleached; boundary diffuse.
- 4932
- IIC1 49 to 60 inches. Mixed colors, approximately 50 percent dark yellowish brown (10YR 4/6 moist) and 50 percent gray (N 5.5/0 moist); crushed color yellowish brown to light olive brown (10YR 5/4 to 2.5Y 5/4 moist); light to medium clay loam; firm; principally massive but some large vertical cleavage faces present; boundary diffuse.
- 4933
- IIC2 60 to 70 inches. Mixed colors, approximately 65 percent dark yellowish brown (10YR 4/4 moist) and 35 percent gray to light gray (N 6.0 moist); crushed color brown to olive brown (10YR 4.5/3 to 2.5Y 4.5/3 moist); texture, consistence and structure as in above horizon.
- 4934

Notes: No transported clay accumulations on vertical faces in upper part of till. Crevices filled with sand, ranging to sandy clay loam, were found in firm till beneath overburden and varied in width from 1-5 inches; sometimes widened into pockets. Although these were avoided on face described, at least one was present in area covered by each pit (2 by 5 feet). Prismatic structure described may not be evident under wet conditions; soil much dryer than normal due to long dry weather period. Textures are field estimates.

SOIL TYPE \*Dinsdale LOCATION Black Hawk County, Iowa

SOIL NOS. S60Iowa-7-1-(1-11) LAB. NOS. 14194-14204

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (9mm)	
0-7	A1p	0.1	0.8	0.8	1.1	2.1	66.3	28.8	35.9	33.0	tr.	
7-11	A12	-	0.6	0.6	1.0	1.9	64.7	31.2	35.4	31.7	-	
11-15	A3	-	0.4	0.4	0.7	2.5	63.3	32.7	36.3	29.8	-	
15-21	B1	-	0.3	0.4	0.3	2.7	62.9	32.9	38.6	27.4	-	
21-29	B2	-	0.5	0.6	1.1	3.5	62.6	31.7	40.3	26.3	-	
29-36	B31	0.1	1.0	1.2	2.3	4.3	61.4	29.7	44.2	22.6	-	
36-43	IIB32	4.2	8.0	8.1	15.2	9.9	31.0	23.6	30.9	17.1	3	
43-50	IIB33	3.9	8.2	8.6	16.0	10.5	31.1	21.7	32.0	17.3	3	
50-56	IIC1	2.8	8.1	8.6	16.0	10.7	30.7	23.1	32.8	16.4	3	
56-62	IIC2	2.8	8.0	8.5	16.7	11.1	32.4	19.5	34.0	17.4	4	
62-73	IIC3	3.8	8.4	8.0	15.7	11.2a	34.2	18.7	34.4	18.7	4	
8C1a	6C1a	ORGANIC MATTER					Bulk Density			Moist. Reten.		
pH	Ext.	6A1a		6B1a	C/N	Field Moist		30 Cn.		O.D.	1/3	4B2
		Iron as Fe	ORGANIC CARBON	NITRO- GEN		4B4 % M.	4A1a g/cc	4B3 % M.	4A1c g/cc	4A1h g/cc	ATMOS. Pieces	15 ATMOS. Sieved
1:1		%	%	%								
5.7	1.0	2.29	0.198	12	19.2	1.49	26.2	1.45	1.59			13.0
5.3	1.1	1.63	0.145	11								13.2
5.3	1.2	1.17	0.110	11								13.2
5.4	1.2	0.79	0.081	10	27.0	1.34	27.8	1.35	1.46			13.9
5.4	1.1	0.54	0.061	9	26.0	1.34	27.2	1.34	1.46			13.6
5.3	1.1	0.33										13.1
5.6	1.8	0.10			16.3	1.66	16.2	1.66	1.78			9.4
5.8	2.0	0.08			17.1	1.68	17.8	1.67	1.80			9.9
6.8	1.8	0.08										9.8
7.9	1.6	0.04										8.9
7.9	1.3	0.03			14.8	1.82	15.8	1.80	1.88			8.5
5A1a	EXTRACTABLE CATIONS 5B1a					Base Sat.		8D1	8D3	Carbonate		
CATION EXCHANGE CAPACITY	6N2b	6O2b	6H1a	6P2a	6Q2a	5A3a	5C1	5C3	Ratio	as CaCO <sub>3</sub> 6E1c		
	Ca	Mg	H	Na	K	Sum	on NH <sub>4</sub> OAc	on Sum Cations	to Clay NH <sub>4</sub> OAc	Ca/Mg	<2-mm.	Clay
NH <sub>4</sub> OAc	milliequivalents per 100g. soil						CEC %	%	CEC		%	%
21.4	13.9	4.4	10.2	0.1	0.3	28.9	87	65	.74	3.2		
20.7	12.2	4.2	11.2	0.1	0.3	28.0	81	60	.66	2.9		
21.2	12.7	5.2	10.0	0.1	0.4	28.4	87	65	.65	2.4		
21.3	13.3	5.2	8.6	0.1	0.4	27.6	89	69	.65	2.6		
21.0	13.5	5.3	7.7	0.1	0.4	27.0	92	71	.66	2.5		
19.8	13.4	5.3	6.2	0.1	0.4	25.4	97	76	.67	2.5		
11.2	7.8	2.7	3.1	0.1	0.2	13.9	96	78	.47	2.9		
11.2	7.9	2.8	2.6	0.1	0.2	13.6	98	81	.52	2.8		
11.2				0.1	0.2				.48		tr.	
9.2				0.1	0.2				.47		9	tr.
8.7				0.1	0.2				.46		12	1

Soil type: \*Dinsdale silty clay loam

Soil No.: 850Iowa-7-1-(1-11)

Location: 1840 feet north and 210 feet west of SE corner of SW1/4 SE1/4 of Sec. 25, T87N, R13W, Black Hawk Co., Iowa.

Vegetation: Alfalfa and bromegrass.

Parent material: Wisconsin loess over Iowan till.

Physiographic position: Upland till plain on convex north-facing ridge top with 3 to 5 percent side slopes.

Slope: 2 percent.

Drainage: Well drained.

Permeability: Moderate in loess; moderately slow in till.

Ground water: None within 73 inches.

Moisture: Slightly moist.

Described by: D. F. Slusher, October 13, 1960.

Horizon and

Lincoln Lab. No.

Alp 0 to 7 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam; cloddy breaking to weak fine granular structure; slightly firm; clear boundary.

Al2 7 to 11 inches. Very dark brown (10YR 2/2) light silty clay loam: weak very fine subangular blocky and



SOIL SURVEY LABORATORY Lincoln, Nebr., October, 1963

SOIL TYPE \* Dinsdale LOCATION Grundy County, Iowa  
silty clay loam

SOIL NOS. S60Iowa-38-2-(1-11) LAB. NOS. 14205-14215

DEPTH INCHES	HORIZON	1B1a	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY				
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	(19mm)	
0-6	Alp	0.1	1.0	1.6	2.3	3.1	62.7	29.2	38.0	28.8	tr.	
6-12	A3	0.2	0.9	1.3	1.8	3.2	59.5	33.1	36.6	26.9	tr.	

Soil type: \*Dinsdale silty clay loam  
 Soil No.: 860Iowa-38-2-(1-11)  
 Location: 437 feet east and 639 feet south of NW corner of NW 1/4 Sec. 20, T88N, R15W, Grundy County, Iowa.  
 Vegetation: Alfalfa hay field. Parent material: Wisconsin loess over Iowan till.  
 Physiographic position: Upland till plain on a convex south-facing ridge with 3 to 4 percent side slopes.  
 Slope: 2 percent. Drainage: Well drained.  
 Permeability: Moderate in loess; moderately slow in till.  
 Ground water: None within 70 inches. Moisture: Slightly moist.  
 Described by: R. I. Turner, October 14, 1960.

Horizon and  
 Lincoln Lab. No.

Alp 0 to 6 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam; cloddy breaking to weak fine subangular blocky structure and then to weak fine granules; slightly firm; common fine tubular pores; gradual boundary.  
 14205  
 A3 6 to 12 inches. Very dark brown (10YR 2/2) light silty clay loam; moderate very fine subangular blocky and moderate fine granular structure; friable; a great deal of black (10YR 2/1) mixing as ped coats and worm casts; kneaded color very dark brown (10YR 2/2); abundant fine tubular inped pores; gradual boundary.  
 14206  
 B1 12 to 16 inches. Dark brown (10YR 3/3) light silty clay loam; moderate fine and very fine subangular blocky structure; friable; few fine black (10YR 2/1) stains on peds; abundant fine tubular inped pores; gradual boundary.  
 14207  
 B21 16 to 21 inches. Dark brown (10YR 4/3) medium silty clay loam; moderate fine subangular blocky structure; friable; kneaded color dark brown (10YR 4/3); abundant fine tubular inped pores; a few faint discontinuous clay films on ped faces; a very few fine soft dark oxide concretions; gradual boundary.  
 14208  
 B22 21 to 26 inches. Dark brown (10YR 4/3) medium silty clay loam; weak medium prismatic structure breaking to medium fine subangular blocks; friable; ped interiors are dark brown (10YR 4/3) and ped surfaces 1/4 to 1/2 unit lower in chroma; kneaded color dark brown (10YR 4/3); abundant fine tubular inped pores; a few faint discontinuous clay films on ped faces; a very few fine soft dark oxide concretions; gradual boundary.  
 14209  
 B23 26 to 30 inches. Dark brown (10YR 4/3) light silty clay loam; weak medium prismatic structure breaking to weak to moderate fine subangular blocks; friable; kneaded color dark brown (10YR 4/3); abundant fine tubular inped pores; a very few fine soft dark oxide concretions; gradual boundary.  
 14210

IIB31 30 to 37 inches. Brown (10YR 5/3) and yellowish brown (10YR 5/4) heavy loam; weak medium prismatic structure breaking to weak medium and coarse subangular blocks; slightly firm; brown (10YR 5/3) on ped exteriors and yellowish brown (10YR 5/4) interiors with a few fine faint yellowish brown (10YR 5/6) and a few fine distinct strong brown (7.5YR 5/8) mottles; common fine tubular inped pores; a slight concentration of stones 1 to 3 inches in diameter in the upper 3 inches of this horizon; gradual boundary.  
 14211  
 IIB32 37 to 44 inches. Dark brown (10YR 4/3) and yellowish brown (10YR 5/4) heavy loam; weak medium to coarse prismatic structure breaking to very weak coarse subangular blocks; slightly firm; dark brown (10YR 4/3) on ped exteriors and yellowish brown (10YR 5/4) interiors with a few fine faint yellowish brown (10YR 5/6) and a few fine distinct strong brown (7.5YR 5/8) mottles; common fine tubular inped pores; a slight concentration of stones 1 to 3 inches in diameter in the upper 3 inches of this horizon; gradual boundary.  
 14212

## SOIL SURVEY LABORATORY Lincoln, Neb.

SOIL TYPE Blina LOCATION Wayne County, Iowa  
silt loamSOIL NOS. 859Iowa-93-1 LAB. NOS. 11538-11549

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (< 19mm)	
0-7	A1	0.2a	0.3a	0.2a	0.2a	0.3a	77.5	21.3	33.2	44.7	-	s11
7-12	A21	0.1a	0.5a	0.3a	0.3a	0.3a	78.2	20.3	32.5	46.1	-	s11
12-18	A22	0.6a	1.1a	0.5a	0.4a	0.5a	76.5	20.4	31.4	45.8	-	s11
18-21	B1	0.3a	1.0a	0.6a	0.6a	0.5a	69.2	27.8	28.0	42.0	-	sic1
21-26	B21	1.3a	1.1a	0.5a	0.5a	0.4a	54.2	42.0	20.9	33.9	-	sic
26-30	B22	0.1a	0.4a	0.3a	0.4a	0.5a	44.4	53.9	17.4	27.7	-	sic
30-32	B23	<0.1	0.2a	0.2a	0.4a	0.7a	44.0	54.5	17.3	27.6	-	sic
32-38	B24	0.1a	0.3a	0.3a	0.5a	0.6a	45.4	52.8	17.6	28.7	-	sic
38-48	B3	<0.1	0.2a	0.2a	0.4a	0.4a	50.9	47.9	19.0	32.5	-	sic
48-53	C1	0.1a	0.2a	0.2a	0.3a	0.4a	57.9	40.9	21.7	36.8	-	sic
53-61	C21	<0.1	0.1a	0.1a	0.2a	0.4a	60.1	39.1	23.2	37.4	-	sic1
61-68	C22	<0.1	0.1a	0.1a	0.2a	0.2a	63.6	35.8	24.5	39.4	-	sic1
pH		ORGANIC MATTER				Free Iron Fe <sub>2</sub> O <sub>3</sub> %	ELECTRI- CAL CONDUCT- IVITY EC-10 <sup>3</sup> MILLIMOS PER CM	CoCO <sub>3</sub> equiv- alent	GYPSSUM mg./100g. SOIL	MOISTURE TENSIONS		4B2
8C1a		6A1a	6B1a									15 Atmos.
1:1		1:10	ORGANIC CARBON %	NITRO- GEN %	C/N							
5.6			2.69	0.227	11.8	0.9	0.4					10.3
5.7			1.62	0.129	12.6	0.9	0.4					8.7
6.0			0.83	0.067	12	1.2	0.4					7.7
5.9			0.64	0.059	11	1.2	0.4					11.5
5.8			0.76	0.069	11	1.8	0.4					17.7
5.6			0.74	0.064	12	1.6	0.4					22.0

Soil type: Emina silt loam  
 Soil No.: S59Iowa-93-1  
 Location: 680 feet east and 150 feet north of southwest corner of NW1/4 of Sec. 15, T68N, R21W, Wayne County, Iowa; near northeast corner of schoolyard of abandoned country school at Harvard, Iowa.  
 Vegetation: Bluegrass sod with some weeds (horse nettles).  
 Parent material: Loess of Wisconsin age; the loess is approximately 8 feet thick and is deposited over Kansan till.  
 Physiographic position: Broad flat uplands of the undissected Kansan till plain.  
 Drainage: Poorly drained.  
 Sampled by and date: F. F. Riecken, W. P. Dietz, and E. C. A. Ringe, July 17, 1959.

Horizon and  
 Lincoln  
 Lab. Number

A1 0 to 7 inches. Very dark gray (10YR 3/1 moist) friable silt loam with some light gray (10YR 7/1 dry) ped coatings; dry color gray (10YR 5/1); moderate medium granular to weak fine platy structure; clear

boundary.

A21 7 to 12 inches. Mixed gray and very dark gray (10YR 6/1 and 3/1 moist) friable medium silt loam with light gray (10YR 7/1 dry) ped coatings; dry color light gray (10YR 7/1); ped coatings more distinct than in above horizon; moderate fine platy breaking to very fine subangular blocky structure; gradual boundary.

A22 12 to 18 inches. Mixed gray and very dark gray (10YR 5/1 and 3/1 moist) friable medium silt loam; upper ped surfaces (top) covered with gray and dark gray (10YR 5/1 and 4/1 moist) coatings; lower ped surfaces are very dark gray (10YR 3/1 moist); dry colors gray and light gray (10YR 5/1 and 7/1); few fine faint yellowish brown (10YR 5/6 to 5/8 moist) mottles; moderate to strong medium platy structure; clear boundary.

B1 18 to 21 inches. Mixed gray and very dark gray (10YR 5/1 and 2.5/1 moist) friable to slightly firm, light silty clay loam; grainy, gray (10YR 5/1 moist) particles on peds; dry color dark gray and light gray (10YR 4/1 and 7/1); moderate fine subangular blocky structure; some thick, discontinuous clay skins on peds; abrupt boundary.

B21 21 to 26 inches. Very dark gray and black (10YR 3/1 and 2/1 moist) very firm medium silty clay; common medium distinct yellowish brown (10YR 5/6 and 5/8 moist) mottles mostly on ped interiors; weak medium subangular blocky structure; peds cohere when soil is moist; thick continuous clay skins; many fine medium-hard iron-manganese concretions; gradual boundary.

B22 26 to 30 inches. Same as above horizon except clear boundary.

B23 30 to 32 inches. Dark grayish brown to grayish brown (10YR 4/1 and 2.5Y 5/1 moist) firm to very firm, light to medium silty clay; common medium distinct yellowish brown (10YR 5/6 moist) mottles and common black (10YR 2/1 moist) clay fills; weak medium subangular blocky structure; peds cohere when moist; continuous clay skins, thinner than above; few fine pores present; fine moderately hard iron-manganese concretions, fewer than above horizon; gradual boundary.

B24 32 to 38 inches. Dark gray to olive gray (2.5Y 4/1 to 5Y 5/2 moist) firm, light silty clay; common fine distinct brownish yellow (10YR 6/6 moist) mottles and some black (10YR 2/1 moist) clay fills; weak medium subangular blocky structure; continuous clay skins, most prominent on big slickensided horizontal ped surfaces; few fine iron-manganese concretions; gradual boundary.

B3 38 to 48 inches. Olive gray (5Y 5/2 moist) firm medium silty clay loam; common coarse distinct yellowish red and yellowish brown (5YR 4/8 and 10YR 5/8 moist) mottles and some black (10YR 2/1 moist) clay fills; weak medium prismatic breaking to weak medium subangular blocky structure; thin clay skins on vertical ped faces; clear boundary.

C1 48 to 53 inches. Olive gray (5Y 5/2 moist) firm light silty clay loam; common coarse distinct yellowish red and strong brown (5YR 4/8 and 7.5YR 5/8 moist) mottles and a few coarse pencil-size black (10YR 2/1 moist) clay fills; weak coarse prismatic to very weak medium subangular blocky structure; thin clay skins on vertical ped faces; boundary gradual.

C21 53 to 61 inches. Olive gray (5Y 5/2 moist) slightly firm light silty clay loam; common very coarse distinct yellowish red (5YR 4/8 to 5/8 moist) mottles; few fine black (10YR 2/1 moist) clay fills; very weak medium subangular blocky structure; few clay skins.

C22 61 to 68 inches. Same as horizon above.

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1959

SOIL TYPE \*Everly LOCATION Clay County, Iowa  
silt loam

SOIL NOS. S59Iowa-21-7-(1-8) LAB. NOS. 11186-11193

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	< 0.002	
0-7	Alp	0.6	6.5	9.2	10.5	6.2	41.3	25.7	32.1	19.9	Tr.	1
7-11	A3	0.3	4.0	6.8	8.6	6.2	44.6	29.5	34.0	20.7	-	cl
11-16	B1	0.3	3.8	6.0	8.0	6.3	45.3	30.3	33.3	21.9	-	cl
16-22	B21	0.9	3.4	4.8	7.3	6.9	45.3	31.4	34.5	21.2	Tr.	cl
22-31	IIB22	2.7	4.6	4.3	8.2	6.0	36.9	37.3	26.6	20.7	Tr.	cl
31-40	IIB3	3.7a	4.6a	4.2a	8.1a	6.4a	41.5	31.5	25.7	26.7	7	cl
40-50	IIC1	4.2a	4.8a	3.9a	7.7a	6.2a	42.0	31.2	25.5	26.9	7	cl
50-60+	IIC2	3.8a	4.7a	4.0a	7.8a	6.3a	41.6	31.8	25.4	26.9	7	cl
<hr/>												
pH		ORGANIC MATTER				6C1a	Bulk Density			Water Content		
8C1a		6A1a	6B1a			Free Iron Fe <sub>2</sub> O <sub>3</sub>	4A1a	4A1c	4A1h	4B1	4B3	4B2
1:1	1:5	1:10	ORGANIC CARBON %	NITRO- GEN %	C/N	%	Field- Moist g/cc	30-Cm. g/cc	O.D. g/cc	Field- Moist %	30-Cm. %	15-Bar %
6.3			2.55	0.219	11.6	1.3						11.5
6.5			1.99	0.174	11.4	1.4	1.37	1.32	1.43	20	28	12.7
6.7			1.59	0.142	11.2	1.6						12.4
6.7			0.88	0.086	10	1.7	1.46	1.43	1.54	18	23	12.0
7.0			0.43	0.052	8	2.3	1.45	1.41	1.50	18	21	13.6
8.0			0.20			1.9						13.1
8.0			0.14			1.8	1.72	1.66	1.74	13	18	13.3
7.9			0.10			1.9						13.9

Soil type: \*Everly silt loam  
 Soil No.: 859Iowa-21-7-(1-8)  
 Location: 340 feet south of road center and 200 feet west of the northeast corner of the NW1/4 of NW1/4 of Sec. 20, T96N, R37W, Clay County, Iowa.  
 Vegetation and use: Corn; cropland.  
 Slope and land form: Tasegwell till plain. Gently convex low ridge that rises slightly to a nearly level area to the west. Slope gradient at sample site is about 2 percent to the north, south, and east.  
 Drainage: Well drained.  
 Parent material: About 22 inches of gritty poorly sorted loess or similar sediment overlying calcareous clay loam glacial till.  
 Collected by: R. H. Jordan and R. L. Juve.  
 Described by: F. J. Carlisle and R. I. Turner, June 12, 1959.

Horizon and  
 Lincoln  
 Lab. Number

Alp 11186	0 to 7 inches. Very dark brown (10YR 2/1.6, 4/1 dry) heavy gritty silt loam; massive breaking to weak fine granular and weak fine subangular blocky; friable; much visible fine sand, most of which is clear and uncoated but some has patchy dark brown coatings; clear boundary.
A3 11187	7 to 11 inches. Very dark brown (10YR 2.3/2) ped surfaces over very dark grayish brown (10YR 3/2) ped interiors (10YR 4/1.5 dry), light gritty silty clay loam, estimated 28 percent clay; moderate fine granular and fine subangular blocky; friable; many fine sand grains are partially coated with dark brown and other grains are uncoated; common fine tubular pores; gradual boundary.
B1 11188	11 to 16 inches. Very dark grayish brown (10YR 3/2) and very dark brown (10YR 2/1.6) in about equal proportions (4/1 and 4/2 dry) with darkest color mostly in narrow tongues that appear to be old root and wormholes, gritty light silty clay loam, estimated 30 percent clay; weak fine subangular blocky; friable; a few fine dark brown spots; many fine and few medium tubular pores; gradual boundary.
B21 11189	16 to 22 inches. Dark brown (10YR 3.5/3, 5/3 dry) gritty silty clay loam, estimated 31 percent clay, containing noticeably more fine sand than horizon above; moderate fine subangular blocky; friable; many fine
<hr/>	
IIB22 11190	22 to 31 inches. Dark brown (10YR 3.5/3, 5/3 dry) medium clay loam, estimated 34 percent clay; compound weak medium prismatic and moderate fine subangular blocky; few smooth shiny dark brown patches on ped faces; slightly firm under weak pressure and firm and plastic under strong pressure; few fine faint gray mottles in the lower part; common fine and few medium and coarse tubular pores; some fine gravel; gradual boundary.
IIB3 11191	31 to 40 inches. Dark brown (10YR 4/3) clay loam, estimated 32 percent clay; compound weak medium to coarse prisms and weak medium subangular blocky; firm; calcareous matrix; many firm carbonate concretions; common fine distinct grayish brown mottles and a few browner mottles; many dark oxide dendrites; shiny smooth dark brown patches on ped faces; many pebbles have thin coating of carbonate on their lower surfaces; common fine tubular pores; gradual boundary.
IIC1 11192	40 to 50 inches. Similar to horizon above but lacks weak subangular blocky structure and carbonate concretions are less numerous; gradual boundary.
IIC2 11193	50 to 60 inches plus. Yellowish brown (10YR 5/4) clay loam; very weak prismatic; firm; common faint dark yellowish brown and medium distinct gray (10YR 5/1 to 5/2) mottles; many dark oxide dendrites; carbonate concretions similar to layer above; calcareous matrix; common fine and occasional medium tubular pores.

Notes: Colors are for fully moist soil unless indicated otherwise. Roots decrease in numbers gradually with depth. Only a few roots present and these are mostly above 16-inch depth.

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1959SOIL TYPE \*Everly LOCATION Clay County, Iowa  
silt loamSOIL NOS. S59Iowa-21-8-(1-8) LAB. NOS. 11194-11201

DEPTH INCHES	HORIZON	1B1a	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	( $< 9\mu$ )	
0-8	Alp	1.8	6.0	6.5	9.7	5.5	41.5	29.0	30.5	21.2	-	cl
8-12	A3	1.2	4.2	4.8	8.1	5.2	42.8	33.7	29.4	22.7	Tr.	cl
12-16	B1	1.0	3.6	4.4	8.1	5.7	42.6	34.6	30.3	22.3	Tr.	cl
16-20	B21	2.5	4.3	4.6	8.5	6.2	40.9	33.0	28.8	22.8	Tr.	cl
20-26	B22	2.3	4.2	4.5	8.9	7.8	39.1	33.2	30.2	21.4	Tr.	cl
26-36	IIB3	7.0a	5.4a	4.3a	8.5a	7.9a	41.4	25.5	29.8	24.0	7	1
36-50	IIC1	4.4a	4.8a	4.0a	8.2a	8.5a	44.9	25.2	31.3	26.6	7	1

Soil type: \*Everly silt loam  
 Soil No.: 859Iowa-21-8-(1-8)  
 Location: 340 feet east of road center and 880 feet south of the northwest corner of SW1/4 of Sec. 13, T97N, R37W, Clay County, Iowa.  
 Vegetation and use: Corn; cropland.  
 Slope and land form: Tazewell till plain. Gently convex 2 percent slope.  
 Drainage: Well drained.  
 Parent material: About 2 feet of gritty poorly sorted loess or similar sediment overlying calcareous clay loam glacial till.  
 Collected by: R. H. Jordan and R. L. Juve.  
 Described by: F. J. Carlisle and R. I. Turner, June 12, 1959.

Horizon and  
 Lincoln  
 Lab. Number

Alp 11194	0 to 8 inches. Black (10YR 2.3/1, 3.5/1 dry) heavy gritty silt loam, estimated 27 percent clay; massive in place but breaking to weak fine subangular blocky; friable; most fine sand grains are clear and uncoated but a few have patchy brown surface stains; clear boundary.
A3 11195	8 to 12 inches. Black (10YR 2.3/1) gritty light silty clay loam, estimated 28 percent clay; moderate fine granular and subangular blocky; friable; contains a few small spots of very dark grayish brown (10YR 3/2); dry colors are 10YR 3/1 and 4/2, rubbed color about 2.5/1.5; common fine and very fine tubular pores; gradual boundary.
B1 11196	12 to 16 inches. Mixed black (10YR 2.3/1) and very dark grayish brown (10YR 3/2) in about equal proportions, gritty silty clay loam, estimated 32 percent clay; moderate fine and very fine subangular blocky; friable; common fine and very fine tubular pores; gradual boundary.
B21 11197	16 to 20 inches. Dark brown (10YR 4/3) clay loam, estimated 34 percent clay; about 50 percent of exposed vertical surface consists of very dark gray and very dark grayish brown material predominantly in vertical worm and root channels; moderate fine subangular blocky; friable; an occasional pebble; common fine tubular pores; gradual boundary.
B22 11198	20 to 26 inches. Dark brown (10YR 4/3) clay loam approaching silty clay loam, estimated 34 percent clay; about 15 percent of exposed vertical surface is very dark gray material in vertical channels as above; weak fine subangular blocky; slightly firm; many pebbles; common fine and a few medium tubular pores; clear boundary.
IIB3 11199	26 to 36 inches. Dark yellowish brown (10YR 4/4) clay loam, estimated 32 percent clay; weak fine subangular blocky; slightly firm; calcareous matrix; a few firm white carbonate concretions in lower part; pebbles larger than 1/2 inch in diameter have thin carbonate coating on lower surface; common fine and few medium tubular pores; some fine faint gray mottles in lower part; gradual boundary.
IIC1 11200	36 to 50 inches. Yellowish brown (10YR 5/4) clay loam; massive; slightly firm; calcareous matrix; common carbonate concretions of irregular shapes up to 1-1/2 cm. in diameter; common fine and few medium to coarse tubular pores; few fine faint grayish brown (10YR 5/2) mottles; gradual boundary.
IIC2 11201	50 to 60 inches plus. Yellowish brown (10YR 5/4) clay loam; massive; very firm; common medium distinct dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) mottles; carbonate concretions and pores similar to layer above.

Notes: Colors are for fully moist soil unless indicated otherwise. A narrow seam of yellowish brown sand extends from bottom of sampling pit up through horizons IIC2 and IIC1.



SOIL SURVEY LABORATORY Lincoln, Nebr.

SOIL TYPE Fayette LOCATION Clayton County, Iowa  
silt loam

SOIL NOS. S59Iowa-22-1 LAB. NOS. 11520-11527

1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1

Soil type: Fayette silt loam

Soil No.: S59Iowa-22-1

Location: NE1/4 of SW1/4 of Sec. 35, T95N, R3W, Mendon Township, Clayton County, Iowa; approximately 75 feet inside the entrance to Pike's Peak State Park and 25 feet to the right.

Vegetation: Oak-hickory forest.

Parent material: Gray brown Podzolic soils developed on post Iowan-post Tazewell loess; Fayette soils are the forested members of a bio sequence which includes the Tama series, a Brunizem, and the Downs series, a transition.

Slope: 2 percent convex.

Drainage: Well drained.

Described by and date: Roger B. Parsons, July 22, 1959.

Horizon and  
Lincoln  
Lab. Number

Ao	1/2 to 1 inch thick. Partly decomposed forest litter from white and red oak and shagbark hickory.
A1 11520	0 to 2 inches. Very dark gray (10YR 3/1 moist) silt loam; strong very fine granular structure; very friable when moist; abundant fine roots; abrupt and wavy horizon boundary.
A2 11521	2 to 9 inches. Pale brown (10YR 6/3 moist) silt loam; moderate to strong very thin platy structure; friable when moist; clear and wavy horizon boundary.
B1 11522	9 to 17 inches. Brown (10YR 4/3 moist) fine silt loam; moderate very fine subangular blocky structure; slightly firm when moist; vesicular; prominent very pale brown (10YR 7/3 moist) grainy coatings on ped faces; common thin discontinuous clay skins on horizontal and vertical ped faces; clear and wavy horizon boundary.
B21 11523	17 to 24 inches. Brown (10YR 4/3 moist) silty clay loam; strong fine subangular blocky structure; slightly firm to firm when moist; few grainy gray coatings on beds; abundant discontinuous clay skins;
	clear and wavy horizon boundary.
B22 11524	24 to 35 inches. Brown (10YR 4/3 moist) silty clay loam; strong fine subangular blocky structure; slightly firm to firm when moist; prominent continuous dark yellowish brown (10YR 4/4 moist) clay skins on horizontal and vertical ped faces; some black (2.5Y 2/4) manganese concretions; diffuse and wavy horizon boundary.
B23 11525	35 to 42 inches. Brown (10YR 4/3 moist) silty clay loam; strong fine subangular blocky structure; slightly firm to firm when moist; prominent nearly continuous clay skins on ped faces; clear and wavy horizon boundary.
B3 11526	42 to 48 inches. Yellowish brown (10YR 5/4 moist) silty clay loam; moderate fine subangular blocky structure to massive; slightly firm when moist; discontinuous dark yellowish brown (10YR 4/4 moist) clay skins mostly on vertical ped faces; clear and wavy horizon boundary.
C1 11527	48 inches plus. Yellowish brown (10YR 5/6 moist) fine silt loam; massive; slightly firm when moist; some clay skins prominent along vertical fracture planes.

SOIL SURVEY LABORATORY  
Beltsville, Maryland

LOCATION Jackson County, Iowa

SOIL TYPE Fayette silt loam

LAB NOS. D3853-D3874

Project and  
Field Nos. Z-1-2-8-(223-233)

LABORATORY NUMBER	DEPTH INCHES	HORIZON A	PARTICLE SIZE DISTRIBUTION (in mm) (per cent)										TEXTURAL CLASS			
			1B1b													
			VERY COARSE SAND 2-1	COARSE SAND 7-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 10-0.05	SILT 0.05-0.002	CLAY ≤ 0.002	INTERNATIONAL		2A2				
										II	III	> 2				
D3853	0-3	A1	0.1	0.4	0.3	1.2	6.0	76.3	15.7	46.0	37.1	0				
D3854	3-6	A21	0.0	0.4	0.3	0.7	5.9	77.5	15.2	46.0	37.8	Tr.				
D3855	6-9	A22	0.1	0.3	0.3	0.7	6.0	77.2	15.4	46.0	37.6	0				
D3856	9-12	A22	0.0	0.2	0.2	0.3	5.5	78.4	15.4	45.2	38.9	0				
D3857	12-16	A3	0.0	0.2	0.2	0.3	5.3	76.8	17.2	44.8	37.5	0				
D3858	16-19	B1	0.0	0.2	0.1	0.3	5.4	73.9	20.1	44.4	35.1	0				
D3859	19-22	B1	0.0	0.1	0.1	0.3	5.0	71.8	22.7	43.6	33.4	0				
D3860	22-26	B21	0.0	0.1	0.1	0.3	5.2	68.3	26.0	43.0	30.7	0				
D3861	26-29	B21	0.0	0.0	0.1	0.2	5.1	65.5	29.1	42.3	28.4	0				
D3862	29-33	B22	0.0	0.1	0.1	0.2	5.9	64.9	28.8	43.0	28.0	0				
D3863	33-35	B22	0.0	0.0	0.1	0.2	5.5	65.0	29.2	42.5	28.1	0				
D3864	35-38	B22	0.0	0.1	0.1	0.4	6.2	63.9	29.3	44.2	26.2	0				
D3865	38-42	B23	0.0	0.0	0.0	0.2	5.4	63.4	31.0	42.3	26.5	0				
D3866	42-46	B23	0.0	0.1	0.1	0.3	5.2	63.3	31.0	42.0	26.7	0				
D3867	46-50	B31	0.0	0.1	0.1	0.3	5.4	64.3	29.8	43.2	26.7	0				
D3868	50-54	B31	0.0	0.1	0.1	0.4	5.8	65.5	28.1	44.0	27.4	0				
D3869	54-58	B32	0.0	0.0	0.0	0.2	5.4	67.7	26.7	46.0	27.1	0				
D3870	58-62	B32	0.0	0.1	0.1	0.3	4.8	68.0	26.7	45.4	27.6	0				
D3871	62-68	B33	0.0	0.1	0.1	0.5	4.5	68.8	26.0	44.6	28.9	0				
D3872	68-74	C1	0.0	0.0	0.0	0.1	3.5	71.5	24.9	44.1	30.9	0				
D3873	74-80	C2	0.0	0.0	0.0	0.2	4.1	73.5	22.2	46.9	30.8	0				
D3874	120-130	C3	0.0	0.0	0.0	0.1	4.0	79.8	16.1	52.2	31.6	0				
		pH	ORGANIC MATTER				FREE IRON OXIDE Fe <sub>2</sub> O <sub>3</sub> %			MOISTURE RETAINED AT						
		801a H <sub>2</sub> O 1.1	6A3a Organic Matter %				NITROGEN %	C/N		BULK DENSITY g/cc	1/10 ATMOS %	1/3 ATMOS %	15 ATMOS. %			
D3853	6.6		4.4													
D3854	5.0		1.5													
D3855	4.6		0.9													
D3856	4.7		0.7													
D3857	4.7		0.5													
D3858	4.7		0.4													
D3859	4.7		0.3													
D3860	4.8		0.2													
D3861	4.9		0.3													
D3862	4.9		0.3													
D3863	5.0		0.3													
D3864	5.1		0.3													
D3865	5.1		0.4													
D3866	5.1		0.2													
D3867	5.1		0.1													
D3868	5.2		0.2													
D3869	5.2		0.2													
D3870	5.3		0.1													
D3871	5.4		0.0													
D3872	5.6		0.0													
D3873	5.7		0.0													
D3874	7.9		0.0													
		CATION EXCHANGE CAPACITY (SUM)	EXTRACTABLE CATIONS				5B2	BASE SATURAT- ION %								
		604a Ca	604a Mg	Na	K	603a H										
		milliequivalents per 100g soil														
D3853		8.2	4.1			4.5										
D3854		1.9	1.8			6.5										
D3855																
D3856		1.5	1.3			6.5										
D3857		2.1	1.4			6.7										
D3858																
D3859																
D3860		6.8	3.3			7.6										
D3861		8.3	3.8			8.0										
D3862		8.7	4.0			7.9										
D3863																
D3864		10.1	4.5			6.7										
D3865		11.3	5.1			6.8										
D3866																
D3867		11.6	5.4			6.1										
D3868																
D3869		10.5	5.1			5.1										
D3870		10.7	5.0			4.8										
D3871																
D3872																
D3873		9.8	5.0			3.9										
D3874		9.8	5.0			0.0										

a. Horizonation nomenclature added in 1965 by R. I. Dideriksen.

Soil type: Fayette silt loam

Location: NE1/4 NE1/4 NE1/4 Sec. 11, T85N, R3E, Jackson County, Iowa. Pit dug 8 rods east center gravel road, 7 rods south edge of woodlot, and about 1 rod southeast abandoned road in woods in ungrazed woodlot.

Vegetation: Chiefly oak with some hickory, poplar, elm, red cedar, wild cherry, and shrubs; also a little grass.

Slope: 6 percent southwest.

Loess 183 inches deep, calcareous at 110 inches.

Sampled by: R. J. Muckenhirn, L. T. Alexander, and A. M. O'Neal, October 3, 1944.

Horizon and Beltsville Lab. Number

- A1  
D3853 0 to 3 inches. Brownish black (when moist) silt loam; fine granular structure; organic matter and worm casts abundant; roots very abundant.
- A21  
D3854 3 to 6 inches. Light brownish gray silt loam; very fine platy and fine granular structure; aggregates flattened, crushing easily to light yellowish brown; worm burrows and casts fairly abundant; roots abundant.
- A22  
D3855 6 to 9 inches. Light yellowish brown silt loam; fine platy and granular structure; aggregates moderately vesicular, flattened, thinly coated with gray and crushing easily to light yellowish brown; worm burrows and casts and roots fairly abundant.
- A22  
D3856 9 to 12 inches. Texture and color same as in 6- to 9-inch layer. Coarse granular structure; aggregates moderately to highly vesicular, lightly sprinkled with gray and crushing easily to moderate yellowish brown; roots generally fibrous, worm burrows, and casts fairly abundant.
- A3  
D3857 12 to 16 inches. Moderate yellowish brown silt loam; medium nut structure, faintly platy; aggregates moderately vesicular, irregularly shaped, noncompact, lightly sprinkled with gray, and crushing easily without color change; worm burrows, casts, and roots fairly abundant.
- B1  
D3858 16 to 19 inches. Moderate yellowish brown silt loam; weakly developed medium nut structure; aggregates slightly vesicular, lightly sprinkled with gray, and crushing easily without color change; worm burrows and casts few, roots fairly abundant.
- B1  
D3859 19 to 22 inches. Moderate yellowish brown heavy silt loam; medium blocky structure; aggregates slightly vesicular, very lightly sprinkled with gray, specked with dark brown, and crushing easily to bright moderate yellowish brown; worm burrows few, roots fairly abundant.
- B21  
D3860 22 to 26 inches. Moderate yellowish brown silty clay loam; medium blocky structure; aggregates slightly vesicular, lightly sprinkled with gray, specked with dark brown, and crushing very easily without color change; worm burrows few, roots fairly abundant.
- B21  
D3861 26 to 29 inches. Dark yellowish brown to moderate brown silty clay loam; compact, medium blocky structure; aggregates slightly vesicular, lightly coated with gray, and crushing with moderate resistance to moderate yellowish brown; a few fibrous roots in crevices.
- B22  
D3862 29 to 33 inches. Moderate brown silty clay loam; compact, medium to coarse blocky structure; aggregates slightly vesicular, well coated with gray, and crushing with moderate resistance to moderate yellowish brown; roots few.
- B22  
D3863 33 to 35 inches. Moderate to dark yellowish brown silty clay loam; medium blocky structure; aggregates slightly vesicular, well coated with gray, and crushing with light to moderate resistance to moderate yellowish brown; roots fairly abundant.
- B22  
D3864 35 to 38 inches. Dark yellowish brown light silty clay loam; coarse blocky structure; aggregates very slightly vesicular, well coated with gray, and crushing with moderate resistance to moderate yellowish brown; roots fairly abundant.
- B23  
D3865 38 to 42 inches. Dark yellowish brown silty clay loam; compact, coarse to very coarse blocky structure; aggregates moderately coated with gray, specked with dark brown, and crushing with moderate to strong resistance to moderate yellowish brown; roots fairly abundant.
- B23  
D3866 42 to 46 inches. Dark yellowish brown heavy silty clay loam; coarse blocky structure; aggregates slightly vesicular, sprinkled with gray, and crushing with moderate resistance to moderate yellowish brown; roots fairly abundant. following crevices.

SOIL SURVEY LABORATORY  
Beltsville, Maryland

LOCATION Iinn County, Iowa

SOIL TYPE Fayette silt loam

LAB NOS. D3938-D3959

Project and  
Field Nos. Z-1-2-8-(285-295)

LABORATORY NUMBER	DEPTH INCHES	HORIZON a	PARTICLE SIZE DISTRIBUTION (in mm) (per cent)										TEXTURAL CLASS						
			1B1b		3A1														
			VERY COARSE SAND 2-1	COARSE SAND 0.5-0.25	MEDIUM SAND 0.25-0.10	FINE SAND 0.10-0.05	VERY FINE SAND 0.05-0.002	SILT 0.002-0.02	CLAY 0.02-0.002	INTERNATIONAL		2A2 ≥ 2							
										II	III								
D3938	0-3	A1	0.2	0.7	0.4	0.9	5.6	79.2	13.0	43.2	42.2	Tr.							
D3939	3-6	A21	0.1	0.4	0.4	0.8	5.7	80.9	11.7	44.1	43.0	Tr.							
D3940	6-9	A21	0.1	0.5	0.4	1.0	5.9	80.0	12.1	44.7	41.9	Tr.							
D3941	9-12	A22	0.1	0.4	0.3	0.6	5.1	77.4	16.1	41.8	41.1	Tr.							
D3942	12-15	A3	0.1	0.2	0.2	0.5	5.3	72.8	20.9	37.4	41.0	0							
D3943	15-19	B1	0.0	0.1	0.1	0.3	5.3	69.0	25.2	38.5	35.9	0							
D3944	19-23	B21	0.0	0.1	0.1	0.5	8.2	63.0	28.1	41.7	29.7	0							
D3945	23-26	B21	0.0	0.1	0.1	0.5	9.5	60.4	29.4	43.0	27.2	0							
D3946	26-29	B22	0.0	0.1	0.1	0.6	10.4	58.8	30.0	44.0	25.6	0							
D3947	29-33	B22	0.0	0.1	0.1	0.6	11.3	58.7	29.2	45.9	24.6	0							
D3948	33-36	B22	0.0	0.1	0.1	0.6	11.1	57.8	30.3	46.4	22.9	0							
D3949	36-39	B22	0.0	0.1	0.1	0.4	10.4	59.7	29.3	48.1	22.3	0							
D3950	39-41	B23	0.0	0.1	0.1	0.4	9.9	61.1	28.4	47.9	23.4	0							
D3951	41-44	B23	0.0	0.1	0.1	0.4	9.9	61.3	28.2	47.3	24.2	0							
D3952	44-47	B23	0.0	0.1	0.1	0.4	10.0	61.4	28.0	48.5	23.2	0							
D3953	47-50	B31	0.0	0.1	0.1	0.4	11.2	59.8	28.4	49.4	21.9	0							
D3954	50-53	B31	0.0	0.1	0.1	0.5	12.3	60.2	26.8	53.2	19.8	0							
D3955	53-56	B31	0.0	0.1	0.1	0.6	13.4	58.7	27.1	52.3	20.2	0							
D3956	56-60	B32	0.0	0.1	0.1	0.5	13.5	59.1	26.7	52.0	20.9	0							
D3957	60-65	B32	0.0	0.1	0.1	0.5	11.8	61.5	26.0	52.5	21.1	0							
D3958	65-75	B33	0.0	0.1	0.1	0.4	10.6	62.0	26.8	50.2	22.7	0							
D3959	180-234	C	0.0	0.1	0.1	0.3	11.7	70.0	17.8	60.2	21.7	0							
pH			ORGANIC MATTER				FREE IRON OXIDE Fe <sub>2</sub> O <sub>3</sub> %				MOISTURE RETAINED AT								
8C1a			6A3a								BULK DENSITY g/cc	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %					
H <sub>2</sub> O			Organic Matter %																
1.1			NITROGEN C/N																
D3938	5.7			3.6															
D3939	5.0			1.3															
D3940	5.0			0.6															
D3941	5.1			0.4															
D3942	4.9			0.3															
D3943	4.8			0.3															
D3944	4.9			0.3															
D3945	5.0			0.4															
D3946	5.0			0.4															
D3947	5.1			0.3															
D3948	5.1			0.1															
CATION EXCHANGE CAPACITY (SUM)			EXTRACTABLE CATIONS 5B2				BASE SATURAT- ION %												
			6N4a Ca	6O4a Mg	Na	K	6H3a H												
			milliequivalents per 100g soil																
D3938			5.5	1.3			7.6												
D3939			1.4	0.7			7.3												
D3940																			
D3941			3.1	1.2			5.0												
D3942																			
D3943																			
D3944			7.4	3.2			8.3												
D3945																			
D3946			9.9	4.2			8.0												
D3947			10.0	4.1			7.5												
D3948			10.9	4.6			7.3												
D3949																			
D3950			10.8	4.7			6.9												
D3951																			
D3952			11.0	4.7			6.6												
D3953																			
D3954			10.8	4.6			5.4												
D3955																			
D3956			11.0	4.9			5.0												
D3957																			
D3958			11.2	5.0			4.8												
D3959			11.5	4.2			0.0												

a. Horizonation nomenclature added in 1965 by R. I. Dideriksen.

Soil type: Fayette silt loam  
 Location: NE1/4 SE1/4 NE1/4 Sec. 13, T83N, R7W, Linn County, Iowa. Sample taken 260 paces south and 5 paces west of northeast corner in ungrazed woods, oak-hickory association with basswood and ironwood as minor species.  
 Slope: 5 percent. Deep boring to 232 inches revealed loess throughout with calcareous loess occurring below 180; from 80 to 200 inches moderate yellowish brown, at 200 inches light gray.  
 Sampled by: R. J. Muckenhirn, F. F. Riecken, L. T. Alexander, and A. M. O'Neal, October 6, 1944.

Horizon and Belts-  
ville Lab. Number

A1 D3938	0 to 3 inches. Brownish black silt loam; very fine granular structure; numerous roots up to 1/4-inch in diameter.
A21 D3939	3 to 6 inches. Light yellowish brown to pale brown silt loam; fine platy and medium granular structure; crushes easily to very weak brown; worm casts, burrows, and roots abundant.
A21 D3940	6 to 9 inches. Pale brown silt loam; medium granular and fine platy structure; aggregates flattened, crushing easily to light yellowish brown; worm burrows and casts abundant.
A22 D3941	9 to 12 inches. Light to moderate yellowish brown silt loam; weakly developed medium platy and medium to coarse granular structure; aggregates moderately vesicular, very lightly sprinkled with gray, crushing easily to light yellowish brown; worm and insect burrows, worm casts, roots, and root channels up to 3/4-inch in diameter fairly abundant.
A3 D3942	12 to 15 inches. Moderate yellowish brown silt loam; medium nut structure, faintly medium platy particularly in upper part; aggregates moderately vesicular, lightly sprinkled with gray, and crushing easily to light yellowish brown; few worm burrows; roots fairly abundant; this layer grades into the one above and the one below.
B1 D3943	15 to 19 inches. Moderate brown to moderate yellowish brown silty clay loam; medium blocky structure; aggregates slightly vesicular, lightly coated with gray, and crushing easily to moderate yellowish brown; roots few, generally 1/8- to 1/2-inch in diameter.
B21 D3944	19 to 23 inches. Moderate yellowish brown silty clay loam; medium blocky structure; aggregates slightly vesicular, angular, coated with gray, crushing easily to moderate yellowish brown; roots few.
B21 D3945	23 to 26 inches. Moderate brown silty clay loam; medium to coarse blocky structure; otherwise same as 19 to 23-inch layer.
B22 D3946	26 to 29 inches. Moderate brown heavy silty clay loam; coarse blocky structure; aggregates slightly vesicular, well coated with gray, and crushing with moderate resistance to moderate yellowish brown; roots very few, present only in crevices.
B22 D3947	29 to 33 inches. Moderate brown silty clay loam; otherwise similar to 26- to 29-inch layer but with less gray coating.
B22 D3948	33 to 36 inches. Dark yellowish brown silty clay loam; coarse blocky structure; aggregates slightly vesicular, irregularly gray-coated, crushing easily to light yellowish brown; roots very few.
B22 D3949	36 to 39 inches. Moderate to dark yellowish brown silty clay loam; coarse blocky structure; aggregates slightly vesicular, irregularly gray-coated, crushing easily to moderate yellowish brown; a few roots in crevices.
B23 D3950	39 to 41 inches. Dark yellowish brown light silty clay loam; coarse blocky structure; aggregates moderately vesicular with some black specks and gray mottling, irregularly coated with gray and dark yellowish brown, and crushing easily to light yellowish brown.
B23 D3951	41 to 44 inches. Moderate to dark yellowish brown light silty clay loam; coarse blocky structure; aggregates similar to those in 39- to 41-inch layer; gray coating and gray mottling more pronounced and some orange mottling.
B23 D3952	44 to 47 inches. Moderate yellowish brown silty clay loam; coarse blocky structure; aggregates slightly vesicular, coated with dark yellowish brown and some gray, specked with brown and black, and crushing easily to moderate yellowish brown.
B31 D3953	47 to 50 inches. Same as 44- to 47-inch layer except for very coarse blocky structure and larger aggregates.
B31 D3954	50 to 53 inches. Same as 47- to 50-inch layer.
B31 D3955	53 to 56 inches. Moderate yellowish brown heavy silt loam; very coarse blocky structure; aggregates moderately vesicular, generally coated with gray, crushing easily to moderate yellowish brown.
B32 D3956	56 to 60 inches. Same as 53- to 56-inch layer.
B32 D3957	60 to 65 inches. Moderate yellowish brown silt loam; very coarse blocky structure; aggregates moderately vesicular, irregularly coated with gray, and crushing easily to light yellowish brown.
B33 D3958	65 to 75 inches. Light, moderate yellowish brown silt loam; weakly developed very coarse blocky structure.
C D3959	180 to 234 inches. Light yellowish brown and light brownish gray silt loam; calcareous, somewhat mottled.

Note: Horizonation nomenclature added in 1965 by R. I. Dideriksen.

SOIL SURVEY LABORATORY Lincoln, Nebr.

April 24, 1962

SOIL TYPE Hamburg LOCATION Fremont County, Iowa  
silt loamSOIL NOS. 86Iowa-36-1 LAB. NOS. 15658-15662

		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										
DEPTH INCHES	HORIZON	1B1a									2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	( <u>&lt; 19mm</u> )	
0-2	AC	0.1	0.1	0.2	0.8	13.2	72.4	13.3	72.5	13.6	-	π11

Soil type: Hamburg silt loam

Soil No.: S61Iowa-36-1

Location: 60 feet north and 120 feet east of center of T intersection, extreme side of Sec. 30, T68N, R42W, Fremont County, Iowa; approximately  $5\frac{1}{2}$  miles northwest of Hamburg on county road K.

Native vegetation: Grass, little bluestem, and some scattered scrub oak trees and few scattered cedar.

Physiographic position: Steep slope, 70 percent, facing southwest off of ridge extending west from uplands. Catsteps are well defined.

Parent material: Calcareous coarse loess, Wisconsin in age.

Collected by and date: Raymond I. Dideriksen, and John R. Nixon, March 23, 1961.

Horizon and

Lincoln

Lab. Number

AC	0 to 2 inches. Dark grayish brown (10YR 4/2) coarse silt loam; weak very fine granular; very friable moist or dry; abundant fine roots; very porous; numerous casts; calcareous; boundary gradual.
C1 15659	2 to 10 inches. Dark brown (10YR 4/3) and yellowish brown (10YR 5/4) coarse silt loam; weak very fine granular to massive; very friable moist or dry; abundant very fine roots; numerous fine and medium pores; numerous worm casts; dark brown color seems to extend down along cleavage planes; calcareous; boundary diffuse.
C2 15660	10 to 24 inches. Yellowish brown (10YR 5/4) and pale brown (10YR 6/3) coarse silt loam; weak very fine granular to massive; very friable moist or dry; few very fine roots; numerous fine and medium pores; few brown (10YR 5/3) worm casts; calcareous; boundary diffuse.
C3	24 to 38 inches. Yellowish brown (10YR 5/4) and pale brown (10YR 6/3) coarse silt loam; few fine faint

very few fine roots; numerous very fine pores, some light-colored filament lime present; calcareous; boundary diffuse.

C4 15662	38 to 54 inches. Yellowish brown (10YR 5/4) and pale brown (10YR 6/3) coarse silt loam; few fine faint light brownish gray (2.5Y 6/2) mottles; weak very fine granular to massive; very friable moist or dry; very few fine roots; numerous very fine pores; some very fine soft dark oxides; some light-colored filament lime present; calcareous.
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Notes: All colors are moist. Horizons AC, C1, C3 and C4 were sampled for Bureau of Public Roads.



SOIL SURVEY LABORATORY Lincoln, Nebr. April 24, 1962

SOIL TYPE Ida LOCATION Fremont County, Iowa  
silt loam

SOIL NOS. 861Iowa-36-2 LAB. NOS. 15663-15667

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 < 19mm	
0-7	ApC	0.1a	0.1a	0.1b	0.2b	6.3b	70.8	22.4	55.4	21.8	-	s11
7-13	C1	0.2a	0.1a	0.1a	0.4a	4.7b	73.3	21.2	54.3	23.9	-	s11
13-22	C2	0.3a	0.2a	0.2a	0.4a	4.9b	73.9	20.1	53.1	25.9	-	s11
22-32	C3	0.1	0.3a	0.2a	0.4a	4.3b	75.6	19.2	54.1	26.0	Tr.	s11

Soil type: Ida silt loam  
 Soil No.: 861Iowa-36-2  
 Location: 300 feet south of center of blacktop road, 100 feet west of lane, NE1/4 SW1/4 of Sec. 33, T69N, R42W, Fremont County, Iowa; approximately 1.8 miles from Sidney, Iowa on county road 1.  
 Vegetation: Alfalfa hay.  
 Physiographic position: Slope is 15 percent, south-facing.  
 Parent material: Calcareous loess of Wisconsin age.  
 Collected by and date: Raymond L. Dideriksen and John R. Nixon, March 23, 1961.

Horizon and  
 Lincoln  
 Lab. Number

ApC 15663	0 to 7 inches. Dark brown (10YR 4/3) and dark grayish brown (10YR 4/2) heavy silt loam; weak fine platy breaking to very fine granular; very friable moist or dry; common fine roots; platiness seems to be due to compaction; many fine pores; many worm casts; calcareous; boundary gradual and wavy.
C1 15664	7 to 13 inches. Yellowish brown (10YR 5/4) medium silt loam; weak very fine granular; very friable wet or dry; few very fine roots; numerous very fine pores; many dark brown (10YR 4/3) and few dark brown (10YR 3/3) worm casts; calcareous; boundary diffuse.
C2 15665	13 to 22 inches. Yellowish brown (10YR 5/4) silt loam and few fine light brownish gray (2.5Y 6/2) mottles; weak medium prismatic breaking to very fine granular; very friable moist or dry; few very fine roots; many fine and very fine pores; few 1/4- to 1/2-inch hard lime concretions; numerous worm casts; calcareous; boundary diffuse.
C3 15666	22 to 32 inches. Yellowish brown (10YR 5/4) coarse silt loam with few fine light brownish gray (2.5Y 6/2) mottles; weak medium prismatic breaking to very fine granular; very friable; abundant very fine and fine pores; very few fine roots; lime concretions as in above horizon; few distinct dark soft oxides; few worm casts; calcareous; boundary diffuse.
C4 15667	32 to 48 inches. Yellowish brown (10YR 5/6) coarse silt loam; few fine light brownish gray (2.5Y 6/2) mottles; weak fine granular to massive; very friable; abundant very fine and fine pores; very few fine roots; lime concretions as in above horizon; few distinct dark soft oxides; worm casts appear to be absent; calcareous.

Notes: All colors are moist. Pit description, profile very wet; about 75 feet downslope from Monona ridgetop.

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1		TEXTURAL CLASS
		1B1a								2A2		
		VERY COARSE SAND 2-7	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	( $\leq 9\mu$ )	
0-8	A1	<0.1	0.1	<0.1	0.2a	3.2a	71.8	24.7	50.7	24.4	-	s11
8-14	B(?)	0.2b	0.2b	0.1c	0.2d	3.5d	74.8	21.0	51.6	26.8	Tr.	s11
14-28	C1	0.1b	0.2b	0.1c	0.4d	4.3d	76.9	18.0	56.0	25.4	Tr.	s11
pH		ORGANIC MATTER				Free Iron	ELECTRI- CAL CONDUCTIVITY EC-10 <sup>3</sup> MILLIMHOS PER CM	6E1a	MOISTURE TENSIONS			
8C1a	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITROGEN	C/N	Fe <sub>2</sub> O <sub>3</sub> %		CaCO <sub>3</sub> equiv- alent	GYP-SUM mg./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
I1			%	%		6C1a		%		%	%	%
6.6			2.40	0.226	10.6	1.4		<1				13.0
7.8			1.12	0.108	10.4	1.3		6				9.9
8.0			0.49	0.055	9	1.2		9				8.8
5A1a	EXTRACTABLE CATIONS					5B1a	BASE SAT. % NH <sub>4</sub> Ac EXCH.	5C3 Base Sat. % on Sum Cations	5D1a	5A3a	8D3	MOISTURE AT SATURATION %
CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	6N2b Co	6O2b Mg	6H1a H	6P2a Na	6Q2a K				Sum Bases	Sum Cations	Ca/Mg	
	milliequivalents per 100g. soil					5C1			<-me/100 g>			
22.4	16.9	5.3	4.5	<0.1	0.7	102	84	22.9	27.4	3.2		
18.0		5.0	<0.1	<0.1	0.4							
16.2		4.9	<0.1	0.1	0.4							

a. Trace smooth dark brown to black coner. (Fe-Mn?)  
b. Almost all CaCO<sub>3</sub> coner.  
c. Common CaCO<sub>3</sub> coner.  
d. Same as "a" plus few CaCO<sub>3</sub> coner.

Soil type: Ida silt loam

Soil No.: S58Iowa-43-5

Location: 450 feet south and 320 feet west of the northeast corner of the SW1/4 of the SW1/4 of Sec. 7, T80N, R42W, Harrison County, Iowa.

Slope: 15 percent convex, western exposure.

Vegetation: Big and little bluestem, bluegrass, native legumes, and sparse weeds.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, August 6, 1958.

Horizon and

Lincoln

Lab. Number

Al  
9590 0 to 8 inches. Very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and very fine subangular blocky and medium and fine granular; friable; leached post-Farmdale loess; abrupt to the B(?).

B(?)  
9591 8 to 14 inches. Brown to dark brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; common dark brown (10YR 3/3) and brown to dark brown (10YR 4/3) worm casts; weak medium subangular blocky breaking to fine granular; friable; calcareous; gradual to the Cl.

Cl  
9592 14 to 28 inches. Brown to dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; sparse grayer and browner mottles; massive; friable; calcareous loess; common brown to dark brown (10YR 4/3) worm casts.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1961

SOIL TYPE Ida LOCATION Harrison County, Iowa  
silt loam

SOIL NOS. S59Iowa-43-7 LAB. NOS. 12388-12391

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 < 19mm	
0-6	A1	0.3a	0.1b	0.1b	0.2c	3.9c	76.0	19.4	55.5	24.5	Tr.	s11
6-12	AC	<0.1	0.1b	0.1b	0.5c	4.6c	78.0	16.7	58.1	24.7	Tr.	s11
12-20	C1	<0.1	0.1b	0.1b	0.4c	5.1c	77.3	17.0	57.4	25.1	Tr.	s11
30-40	C2	<0.1	<0.1	0.1b	0.5c	5.1c	80.7	13.6	61.4	24.7	Tr.	s11
8C1a		pH		ORGANIC MATTER		Free Iron	ELECTRI- CAL CONDUCTI- VITY EC x 10 <sup>3</sup> MILLIMHOS PER CM	6E1a CaCO <sub>3</sub> equiv- alent	MOISTURE TENSIONS			4B2
		1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	Fe <sub>2</sub> O <sub>3</sub> %	GYPSUM me./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.	

Soil type: Ida silt loam

Soil No.: S59Iowa-43-7

Location: 460 feet north and 495 feet west of the southeast corner of the SW1/4 of the SW1/4 of Sec. 7, T80N, R42W, Harrison County, Iowa.

Slope: 25 percent west, slightly convex.

Site: Profile is located in a virgin area on a small, 10-foot wide shelf between steps ("catsteps") ranging from 6 to 18 inches in height.

Vegetation: Native grasses, primarily big and little bluestem.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, October 19, 1959.

#### Horizon and

Lincoln

#### Lab. Number

A1 12388	0 to 6 inches. Very dark grayish brown (10YR 3.5/2) silt loam; dark grayish brown (10YR 4/2) crushed; grayish brown (10YR 5/2) dry; moderate fine granular; friable; very abundant worm casts; abundant roots; calcareous post-Pawnee loess; clear lower boundary.
AC 12389	6 to 12 inches. Brown (10YR 4/3) silt loam; common mixing of dark grayish brown (10YR 3.5/2) worm casts; sparse to common fine gray and browner mottles; very weak medium subangular blocky, breaking to granular; very friable; abundant worm casts; gradual lower boundary.
C1 12390	12 to 20 inches. Brown (10YR 5/3) silt loam; common brown (10YR 4/3) worm casts; common fine grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) mottles; massive; very friable; gradual lower boundary.
C2 12391	20 to 40 inches (sampled 30 to 40 inches). Brown (10YR 5/3) silt loam; sparse fine indistinct gray and browner mottles and sparse fine dark manganese concentrations; massive; friable; sparse to common worm casts; sparse small carbonate aggregates; few roots; calcareous post-Pawnee loess.

## SOIL SURVEY LABORATORY Lincoln, Nebr.

October 1963

SOIL TYPE Kenyon LOCATION Bremer County, Iowa  
loam

SOIL NOS. S60Iowa-9-1-(1-11) LAB. NOS. 14105-14115

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										2A2  > 2 mm	TEXTURAL CLASS
		1B1a											
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY					
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	< 0.002		
0-5	A1p	1.9	11.8	12.8	19.4	7.4	28.5	18.2	28.4	16.0	tr.		
5-10	A12	1.8	10.2	10.3	16.4	7.3	31.5	22.5	27.2	18.6	tr.		
10-14	A3	3.2	9.4	9.7	15.8	7.7	30.2	24.0	27.2	17.6	4		
14-19	B1	3.2	7.4	8.3	15.5	9.1	31.0	25.5	29.3	18.0	3		
19-25	B21	2.7	6.3	8.7	17.9	10.8	28.3	25.3	32.3	15.2	3		
25-33	B22	3.5	6.8	8.3	17.6	11.1	29.3	23.4	33.2	15.4	3		
33-40	B23	3.5	6.4	8.3	18.0	11.0	30.6	22.2	33.3	16.7	3		
40-47	B31	2.2	5.6	7.6	16.3	10.1	33.5	24.7	33.0	18.2	tr.		
47-54	B32	2.9	6.4	7.8	15.2	9.2	33.2	25.3	32.8	17.0	2		
54-62	C1	3.4	5.8	7.1	16.4	10.2	36.0	21.1	34.5	19.4	3		
62-76	C2	3.1	5.9	6.8	15.3	10.0	37.0	21.9	34.7	19.7	3		
8C1a		6C1a ORGANIC MATTER					Bulk Density					Moist. Reten.	
pH		Ext. Iron as Fe %	6A1a ORGANIC CARBON %	6B1a NITRO- GEN %	C/N	Field Moist		30 Cm		O.D. g/cc	1/3 ATMOS. Pieces %	15 ATMOS. Sieved %	
						4B4 % M.	4A1a g/cc	4B3 % M.	4A1c g/cc				4A1h g/cc
6.3		1.0	1.99	0.170	12	15.0	1.46	18.2	1.45	1.52		8.6	
5.8		1.2	1.77	0.132	13	17.2	1.52	21.2	1.50	1.58		9.6	
5.4		1.3	1.01	0.089	11							9.2	
5.2		1.4	0.66	0.066	10							9.0	
5.2		1.4	0.40	0.040	10	13.6	1.60	16.5	1.58	1.66		8.5	
5.2		1.5	0.28			10.1	1.65	15.1	1.61	1.69		8.5	
5.7		1.4	0.23									8.9	
6.0		1.7	0.20			11.0	1.72	14.3	1.67	1.76		10.0	
7.0		1.5	0.18			13.2	1.63	18.5	1.58	1.70		10.7	
7.8		1.4	0.13			14.1	1.77	16.3	1.74	1.84		9.4	
7.9		1.3	0.13			15.9	1.74	17.9	1.70	1.81		4.6	
5A1a		EXTRACTABLE CATIONS 5B1a					Base Sat.		8M	8D3	Carbonate as CaCO3 6E1c		
CATION EXCHANGE CAPACITY NH4 OAc	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	5A3a Sum	5C1	5O3	Ratio	Ca/Mg	2-mm. %	Clay %	
							on NH4 OAc CEC %	on Sum Cations %	to Clay NH4 OAc CEC				
15.1	10.4	3.6	5.9	0.1	0.2	20.2	95	71	.83	2.9			
15.5	9.9	3.0	8.3	0.1	0.2	21.5	85	61	.69	3.3			
14.5	9.5	2.7	8.1	0.1	0.2	20.6	86	61	.60	3.5			
13.7	8.4	2.6	7.1	0.1	0.2	18.4	82	61	.54	3.2			
12.2	8.3	2.5	5.9	0.1	0.2	17.0	91	65	.48	3.3			
11.7	8.1	2.3	4.2	0.1	0.2	14.9	91	72	.50	3.5			
11.9	8.8	2.4	3.5	0.1	0.2	15.0	97	77	.54	3.7			
12.9	10.2	2.7	2.8	0.1	0.2	16.0	102	82	.52	3.8			
13.6				0.1	0.2				.54		tr.	-	
10.8				0.1	0.2				.51		10	tr.	
10.6				0.1	0.2				.48		11	tr.	
a. 14 Kg/M <sup>2</sup> to 60 inches.													

a. 14 Kg/M<sup>2</sup> to 60 inches.

Soil type: Kenyon loam

Soil No.: 860Iowa-9-1-(1-11)

Location: 553 feet north and 310 feet east of the SW corner of Sec. 31, T93N, R13W, Bremer County, Iowa.

Vegetation: Oak stubble.

Parent material: Gritty overburden over Iowan till.

Physiographic position: Upland till plain on a convex north-sloping ridge top; side slopes of 3 to 5 percent.

Slope: 2 percent.

Drainage: Moderately well drained.

Permeability: Moderate in gritty overburden; moderately slow in Iowan till.

Ground water: None within 84 inches.

Moisture: Slightly moist.

Described by: D. F. Slusher and R. L. Buckner, October 10, 1960.

Horizon and  
Lincoln Lab No.

A1p 0 to 5 inches. Black (10YR 2/1)<sup>1</sup> loam; cloddy, breaking to weak fine granular structure; friable; gradual  
14105 boundary.

A12 5 to 10 inches. Very dark brown (10YR 2/2) heavy loam; weak fine subangular blocky structure breaking to  
14106 weak fine granules; friable; clear boundary.

A3 10 to 14 inches. Very dark grayish brown (10YR 3/2) heavy loam; moderate fine and very fine subangular  
14107 blocky structure; friable; common fine distinct very dark gray (10YR 3/1) and brown (10YR 4/3) worm casts  
and mixings; kneaded color very dark grayish brown (10YR 3/2); clear boundary.

B<sub>1</sub> 14 to 19 inches. Very dark grayish brown (10YR 2/2) and brown (10YR 4/2) heavy loam; moderate fine sub-



SOIL SURVEY LABORATORY Lincoln, Nebr. October 1963

SOIL TYPE Kenyon LOCATION Bremer County, Iowa  
loam

SOIL NOS. S60Iowa-9-3-(1-13) LAB. NOS. 14125-14137

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1R1b	2A1	2A2	2A3	2A4	2A5	2A6	2A7	2A8	2A9	
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY				
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	< 0.002	
0-5	Alp1	0.8	8.6	12.8	17.9	5.6	35.9	18.4	30.1	18.4	tr.	
5-9	Alp2	0.8	7.3	9.7	11.9	4.3	41.6	24.4	26.3	24.3	tr.	
9-13	A3	1.0	8.0	10.0	13.5	4.8	38.1	24.6	26.2	22.1	1	
13-18	B1	2.7	8.6	10.7	16.8	6.3	30.4	24.5	26.5	17.1	4	
18-24	B21	2.6	6.7	8.9	18.3	8.7	26.3	28.5	28.6	14.6	6	
24-30	B22	2.6	6.0	8.6	18.6	9.0	26.4	28.8	29.5	14.5	2	
30-37	B23	2.0	6.5	8.6	18.7	9.1	26.6	28.5	29.3	15.0	2	
37-45	B31	3.2	6.5	8.5	18.4	9.0	27.0	27.4	29.1	15.4	2	
45-55	B32	3.0	6.6	8.1	18.8	3.7	27.5	27.3	29.6	15.2	1	
55-65	C1	2.8	7.3	8.4	19.3	3.9	28.1	25.2	28.6	17.2	3	
65-74	C2	2.5	6.9	8.0	19.2	9.1	28.5	25.8	29.7	16.5	3	
74-84	C3	2.9	7.5	8.1	19.0	8.8	27.2	26.5	29.1	15.5	1	
84-90	C4	3.0	6.9	8.3	19.2	9.0	28.8	24.8	29.9	16.5	2	
8C1a	6C1a	ORGANIC MATTER					Bulk Density			Moist. Reten.		
	Ext.	6A1a	6B1a								4B2	
pH	Iron	ORGANIC NITRO-				Field Moist	30 Cm.	O.D.	1/3	15		

Soil type: Kenyon loam  
 Soil No.: S60Iowa-9-3-(1-13)  
 Location: Approximately 514 feet east and 508 feet south of NW corner SW1/4 Sec. 6, T93N, R13W, Bremer County, Iowa.  
 Vegetation: Small grain stubble. Parent material: Gritty overburden over Iowan till.  
 Physiographic position: Upland till plain on a convex north-facing ridge about 100 feet below crest; side slopes of 5 to 7 percent.  
 Slope: 4 percent. Drainage: Moderately well drained.  
 Permeability: Moderate in gritty overburden; moderately slow in Iowan till.  
 Ground water: Water table at 74 inches. Moisture: Slightly moist.  
 Described by: D. F. Slusher, October 11, 1960.

Horizon and  
 Lincoln Lab. No.

Alp1 14125	0 to 5 inches. Very dark brown (10YR 2/2) <sup>1</sup> loam; cloddy breaking to weak fine granular structure; friable; gradual boundary.
Alp2 14126	5 to 9 inches. Very dark brown (10YR 2/2) loam; cloddy breaking to weak fine granular structure; common fine faint very dark grayish brown (10YR 3/2) mixing; clear boundary.
A3 14127	9 to 13 inches. Very dark grayish brown (10YR 3/2) loam; weak fine subangular blocky structure breaking to moderate fine granules; friable; common fine faint very dark brown (10YR 2/2) and dark brown (10YR 4/3) mixing and a few fine distinct dark brown (10YR 4/3) worm casts; kneaded color very dark grayish brown (10YR 3/2); common fine tubular pores in peds; gradual boundary.
B1 14128	13 to 18 inches. Mixed dark brown (10YR 4/3) and very dark grayish brown (10YR 3/2) heavy loam; weak fine subangular blocky structure; friable; kneaded color dark grayish brown (10YR 4/2); numerous fine tubular pores in peds; gradual boundary.
B21 14129	18 to 24 inches. Dark brown (10YR 4/3) to yellowish brown (10YR 5/4) heavy loam; weak fine subangular blocky structure; friable; kneaded color yellowish brown (10YR 5/4); numerous fine tubular pores in peds; numerous 1/2- to 3-inch diameter stones concentrated in upper 3 inches of horizon; gradual boundary.
B22 14130	24 to 30 inches. Brown (10YR 5/3) and yellowish brown (10YR 5/6) heavy loam; weak medium prismatic structure breaking to moderate fine subangular blocks; slightly firm; brown (10YR 5/3) on ped surfaces; yellowish brown (10YR 5/6) with a few fine faint yellowish brown (10YR 5/8) mottles inside peds; kneaded color yellowish brown (10YR 5/6); common fine tubular pores in peds; a very few distinct very dark gray (10YR 3/1) clay streaks in root channels; a few soft iron-manganese concretions; gradual boundary.
B23 14131	30 to 37 inches. Grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) heavy loam; moderate coarse prismatic structure breaking to moderate fine subangular blocks; slightly firm; grayish brown (10YR 5/2) with common fine distinct brown (10YR 5/3) mottles on ped surfaces; yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) with a few fine faint yellowish brown (10YR 5/8) mottles inside peds; a few distinct very dark gray (10YR 3/1) vertical clay streaks that are principally on prism faces; a few iron-manganese concretions; gradual boundary.
B31 14132	37 to 45 inches. Grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) heavy loam to light clay loam; weak coarse prismatic structure breaking to moderate fine and medium angular blocks; firm; grayish brown (2.5Y 5/2) with common fine distinct brown (10YR 5/3) mottles on prism faces; yellowish brown (10YR 5/6) and grayish brown (2.5Y 5/2) inside peds; a very few distinct very dark gray (10YR 3/1) vertical clay streaks on ped faces; a few iron-manganese concretions; gradual boundary.
B32 14133	45 to 55 inches. Yellowish brown (10YR 5/6) light clay loam to heavy loam; weak coarse prismatic structure; firm; common fine prominent light gray (10YR 6/1) mottles in most of horizon but in a few places are areas 6 to 12 inches in diameter that are dominantly light gray (10YR 6/1); a few dark gray (10YR 4/1) clay streaks on prism faces; gradual boundary.
C1 14134	55 to 65 inches. Dark brown (7.5YR 4/4) to strong brown (7.5YR 5/6) heavy loam to light clay loam; massive with distinct vertical cleavage to weak medium subangular blocky structure; slightly firm; common medium prominent light gray (10YR 6/1) mottles that are mainly elongated (3 to 4 inches) but a few areas in horizon 6 to 12 inches in diameter are dominantly light gray (10YR 6/1); a few faint dark gray (10YR 4/1) clay streaks in root channels; gradual boundary.
C2 14135	65 to 74 inches. Yellowish brown (10YR 5/4) heavy loam; weak medium subangular blocky structure to massive with some vertical cleavage; slightly firm; common medium prominent light gray (10YR 6/1) mottles; a few soft iron-manganese concretions; gradual boundary.
C3 14136	74 to 84 inches. Yellowish brown (10YR 5/6) heavy loam; massive with some vertical cleavage; slightly firm; common medium prominent elongated (3 to 4 inches) streaks of light gray (10YR 6/1) with random orientation; clear boundary.
C4 14137	84 to 90 inches. As above but calcareous.

Notes: A few clear uncoated quartz grains are on ped faces from 0 to 24 inches. Roots are common from 0 to 9 inches, few from 9 to 37, and none to scarce from 37 to 90 inches. A vertical vein of sand about 1-inch wide was present from 29 to 43 inches. Horizons Alp1, B22, and B32 were sampled for the Bureau of Public Roads.

<sup>1/</sup> Munsell color for moist soil.

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2 (19mm)		
		2.1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002			
0-9	A1	0.3a	1.3a	1.5a	2.4a	3.1	62.5	28.9	36.1	30.6	tr.		
9-13	A3	0.4b	1.6b	1.8a	2.9a	3.3	61.9	28.1	35.9	30.6	tr.		
13-19	B1	0.2b	1.1b	1.1a	1.8a	3.6	61.1	31.1	38.0	27.5	tr.		
19-26	B21	0.2b	0.9b	1.2a	1.9a	5.8	59.4	30.6	44.5	21.6	tr.		
26-31	B22	0.3b	1.9b	2.4a	3.9a	7.1	57.6	26.8	46.5	19.9	tr.		
31-36	IIB31	3.0	10.9	12.7	18.6	8.3	25.6	20.9	27.6	14.3	1		
36-40	IIB32	3.4	9.1	9.7	15.5	8.8	27.9	25.6	26.8	17.0	tr.		
40-46	IIB33	2.9	7.0	6.8	13.6	9.7	31.9	28.1	27.7	20.5	2		
46-52	IIC1	2.9	6.6	7.4	14.4	10.0	30.8	27.9	29.9	18.0	tr.		
52-64	IIC2	3.6c	6.7c	7.2c	13.8c	9.7c	32.1	26.9	28.7	19.9	1		
8C1a	6C1a	ORGANIC MATTER								Bulk Density		Moist. Reten.	
		Ext.	6A1a	6B1a								4B2	
		Iron	ORGANIC	NITRO-			Field Moist	30 Cm.	O.D.		1/3	15	
		as Fe	CARBON	GEN	C/N		4B4	4A1a	4B3	4A1c	4A1h	ATMOS.	
		%	%	%	%	%	% M.	g/cc	% M.	g/cc	g/cc	Pieces	
5.6		0.8	3.03	0.260	12	26.5	1.28	30.1	1.27	1.39		14.3	
5.4		0.9	1.24	0.124	10							12.2	
5.5		1.0	0.68	0.081	8	24.2	1.32	27.3	1.32	1.44		12.9	
6.2		1.0	0.38	0.052	7	21.3	1.37	26.2	1.36	1.50		13.1	
6.4		1.0	0.27			14.4	1.44	24.3	1.38	1.52		12.2	
6.6		1.4	0.12									8.0	
6.9		1.7	0.08			11.6	1.79	15.0	1.72	1.84		9.9	
7.1		2.2	0.08			12.8	1.80	16.6	1.72	1.86		11.6	
7.4		2.0	0.06			12.9	1.78	16.6	1.72	1.84		11.4	
7.7		2.0	0.04			13.3	1.76	17.9	1.70	1.83		11.6	
5A1a		EXTRACTABLE CATIONS 5B1a				Base Sat.		8D1	8D3	Carbonate			
		6N2b	6O2b	6H1a	6P2a	6Q2a	5A3a	5C1	5C3	Ratio		6E1d	
		Ca	Mg	H	Na	K	Sum	on	on	to Clay	Ca/Mg		
								NH <sub>4</sub> OAc	Cations	NH <sub>4</sub> OAc			
		milliequivalents per 100g. soil						CEC %	%	CEC			
24.8	15.5	5.0	12.7	0.2	0.2	33.6	84	62	.86	3.1			
20.2	12.8	3.6	10.0	0.1	0.3	26.8	83	63	.72	3.6			
20.9	14.7	4.4	7.9	0.1	0.4	27.5	94	71	.67	3.3			
21.5	17.4	5.2	4.5	0.1	0.4	27.6	107	84	.70	3.3			
19.9	16.3	4.8	3.6	0.1	0.4	25.2	108	86	.74	3.4	-		
11.4	9.5	2.8	1.6	0.1	0.2	14.2	110	89	.54	3.4	-		
13.1	11.1	3.1	1.6	0.1	0.2	16.1	111	90	.51	3.6	tr.		
13.9	12.0	3.3	1.6	0.1	0.2	17.2	112	91	.49	3.6	tr.		
13.4	11.4	3.2	1.2	0.1	0.2	16.1	111	92	.48	3.6	tr.		
12.6				0.1	0.2				.47		2	tr.	
a.	Few Fe/Mn nodules.												
b.	Common Fe/Mn nodules.												
c.	Few carbonate nodules.												
d.	14 kg/M <sup>2</sup> to 60 inches.												

Soil type: \*Klinger silty clay loam  
 Soil No.: S60Iowa-9-5-(1-10)  
 Location: 284 feet north and 387 feet east of SW corner of NE1/4 SE1/4 of Sec. 26, T91N, R12W, Bremer County, Iowa.  
 Vegetation: Alfalfa-orchardgrass meadow. Parent material: Wisconsin loess over Iowan till.  
 Physiographic position: Upland level till plain, slope convex to the north; near crest.  
 Slope: 1-1/2 percent. Drainage: Imperfectly drained.  
 Permeability: Moderate in Wisconsin loess; moderately slow in Iowan till.  
 Ground water: None within 64 inches. Moisture: Slightly moist.  
 Described by: R. I. Turner, October 12, 1960.

Horizon and  
 Lincoln Lab. No.

- A1  
 14149 0 to 9 inches. Black (10YR 2/1 to N 2/)<sup>1</sup> light silty clay loam; slightly cloddy breaking to weak fine subangular blocky and moderate fine granular structure; slightly firm; gradual boundary.
- A3  
 14150 9 to 13 inches. Black (10YR 2/1) light silty clay loam; moderate fine granular structure; friable; some dark gray (10YR 3/1) mixing by earthworms; kneaded color black (10YR 2/1) to very dark gray (10YR 3/1); common to abundant fine imbed tubular pores; many earthworm casts; gradual boundary.
- B1  
 14151 13 to 19 inches. Very dark grayish brown (2.5Y 3/2) light silty clay loam; moderate fine and very fine subangular blocky structure; friable; very dark gray (10YR 3/1) stains on ped surfaces that decrease with depth; few fine faint olive brown (2.5Y 4/4) mottles; kneaded color very dark grayish brown (2.5Y 3/2); abundant fine and common medium imbed tubular pores; common small moderately hard dark oxide concretions; gradual boundary.
- B21  
 14152 19 to 26 inches. Dark grayish brown (2.5Y 4/2) medium silty clay loam; weak to moderate fine subangular blocky structure; slightly firm; ped exteriors dark grayish brown (2.5Y 4/2) with common fine faint olive brown (2.5Y 4/4) mottles; ped interiors are dark grayish brown (2.5Y 4/2) to light olive brown (2.5Y 5/4); kneaded color 2.5Y 4/2; abundant fine and medium imbed tubular pores; a few thin discontinuous clay films on some concave ped surfaces; common small moderately hard dark oxide concretions; gradual boundary.
- B22  
 14153 26 to 31 inches. Dark grayish brown (2.5Y 4/2) medium silty clay loam; very weak medium prismatic structure breaking to moderate fine subangular blocks; slightly firm; common fine faint olive brown, light olive brown, and grayish brown mottles; kneaded color dark grayish brown (2.5Y 4/2) to light olive brown (2.5Y 5/4); abundant fine and common medium pores; a few very dark gray clay films on some concave ped surfaces and in root channels; common small moderately hard dark oxide concretions; a slight increase in content of sand with depth in this horizon is observed; abrupt boundary.
- IIB31  
 14154 31 to 36 inches. Grayish brown (2.5Y 5/2) to light brownish gray (2.5Y 6/2) light clay loam; moderate coarse prismatic structure breaking to weak medium subangular blocks; firm; few medium distinct yellowish brown (10YR 5/4) mottles on ped interiors; common fine imbed tubular pores; evidence of a few thin gray clay films on concave ped surfaces and some root channels; numerous rounded stones 1/2 to 2 1/2 inches in

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1963

SOIL TYPE \*Klinger LOCATION Bremer County, Iowa  
silt loam

SOIL NOS. S60Iowa-9-6-(1-9) LAB. NOS. 14159-14167

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (9mm)	
0-7	Alp	0.6a	1.8b	2.1c	2.9c	5.7c	59.4	27.5	39.8	26.5	-	
7-13	Al2	0.4a	1.4a	1.7c	2.3c	5.5c	59.5	29.2	39.4	26.6	-	
13-18	A3	0.4a	0.9a	0.9b	1.3b	5.6c	61.1	29.8	40.5	26.9	-	
18-23	B1	0.8a	0.7a	0.6b	0.9b	6.6c	60.6	29.8	41.7	25.9	-	
23-28	B21	0.4a	0.6a	0.7b	1.3b	9.6c	63.2	24.2	51.2	22.2	-	
28-33	B22	0.1a	1.3a	2.2	3.2	12.3	59.8	21.1	54.4	19.1	-	
33-40	IIB3	2.6	8.0	11.5	18.7	10.4	28.7	20.1	32.7	14.2	1	
40-50	IIC1	2.7a	7.2a	6.9a	14.6a	10.1d	38.9	19.6	30.7	25.2	1	
50-68	IIC2	3.8a	7.4a	7.6a	15.8a	10.8d	34.7	19.9	33.3	19.7	1	
8C1a		6C1a	ORGANIC MATTER				Bulk Density				Moist. Reten.	
pH		Ext.	6A1a	6B1a			Field Moist	30 Cm.	O.D.		1/3 ATMOS.	4B2 15 ATMOS.
		Iron	ORGANIC CARBON	NITRO- GEN	C/N		4B4	4A1a	4B3	4A1c	4A1h	

Soil type: Maling silt loam  
 Soil No.: 860Iowa-9-6-(1-9)  
 Location: 760 feet north and 486 feet east of SW corner of Sec. 33, T91N, R12W, Bremer County, Iowa.  
 Vegetation: Small grain stubble. Parent material: Wisconsin loess over Iowan till.  
 Physiographic position: Nearly level upland till plain on a very slightly convex slope.  
 Slope: About 3/4 percent. Drainage: Imperfectly drained.  
 Permeability: Moderate in loess; moderately slow in till.  
 Ground water: None within 68 inches. Moisture: Moist.  
 Described by: D. F. Slusher, October 12, 1960.

Horizon and  
 Lincoln Lab. No.

Alp 14159	0 to 7 inches. Black (10YR 2/1) <sup>1</sup> heavy silt loam; somewhat cloddy breaking to weak fine granular structure; friable; gradual boundary.
Al2 14160	7 to 13 inches. Black (10YR 2/1) heavy silt loam; moderate fine granular structure with distinct horizontal cleavage in upper part; friable; gradual boundary.
A3 14161	13 to 18 inches. Very dark gray (10YR 3/1) light silty clay loam; moderate fine granular and moderate very fine subangular blocky structure; friable; common fine faint very dark grayish brown (2.5Y 3/2) mottles; kneaded color very dark brown (10YR 2/2); a few soft iron-manganese concretions; gradual boundary.
B1 14162	18 to 23 inches. Very dark grayish brown (2.5Y 3/2) medium silty clay loam; weak to moderate very fine subangular blocky structure; friable; common fine faint dark grayish brown (2.5Y 4/2) and very dark gray (10YR 3/1) mottles; kneaded color very dark grayish brown (2.5Y 3/2); common fine tubular pores in pedis; a few soft iron-manganese concretions; gradual boundary.
B21 14163	23 to 28 inches. Dark grayish brown (2.5Y 4/2) to olive brown (2.5Y 4/4) light silty clay loam; weak medium prismatic structure breaking to moderate fine and very fine subangular blocks; friable; few fine faint dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) mottles; kneaded color dark grayish brown (2.5Y 4/2) to olive brown (2.5Y 4/4); common fine and medium tubular pores in pedis; common soft iron-manganese concretions; gradual boundary.
B22 14164	28 to 33 inches. Olive brown (2.5Y 4/4) to light olive brown (2.5Y 5/4) heavy silt loam; weak medium prismatic structure breaking to weak medium subangular blocks; friable; common fine faint light olive brown (2.5Y 5/4 to 5/6) mottles and a few very dark gray (10YR 3/1) worm casts; kneaded color light olive brown (2.5Y 5/4); common soft iron-manganese concretions; this horizon contains more fine sand than the

SOIL SURVEY LABORATORY Lincoln, Nebr. 1/24/58

SOIL TYPE \*Iowdes loam LOCATION Howard County, Iowa

SOIL NOS. 856Iowa-45-5-(1-11) LAB. NOS. 4883-4893

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.07	0.02-0.002	< 0.002	
0-7	Ap	2.2	8.5	8.3	10.8	4.2	50.8	15.2	33.0	26.2	-	s11
7-11	A21	2.1	7.1	7.3	10.1	4.5	53.5	15.4	30.2	31.8	-	s11
11-15	A22	2.8	6.6	6.9	10.4	5.1	48.8	19.4	29.9	28.4	4	1
15-19	B21	2.2	7.0	7.4	12.6	7.5	38.0	25.3	29.6	21.6	2	1
19-23	11B22	2.8	6.6	6.3	11.6	8.7	31.0	33.0	27.2	18.0	Tr.	cl
23-31	11B23	2.4	5.2	5.5	11.6	9.1	29.7	36.5	27.5	17.1	Tr.	cl

Soil type: \*Iowdes loam

Soil No.: 856Iowa-45-5-(1-11)

Location: Approximately 450 feet south and 150 feet west of west side of field gate which is approximately 975 feet west of northeast corner of NW1/4 of Sec. 33, T99N, R13W, Howard County, Iowa.

Vegetation or crop: Red clover and timothy meadow.

Parent material: Firm Iowan till with silty overburden.

Physiographic position: Crest of low convex ridge on upland about 1/4 mile from stream.

Topography: Gently undulating.

Slope: 3 percent.

Drainage: Moderately well drained.

Ground water: None observed within 65 inches. During wet periods there appears to be a perched water table above the firm till.

Permeability: Very slow for the firm till and moderate for the overburden.

Moisture: Slightly moist.

Stoniness: Some pebbles occur through the firm till, a band of pebbles is concentrated just above the firm till, and the silty material above this is usually pebble free.

Described by: L. E. Tyler, October 12, 1956.

Horizon and

Lincoln

Lab. Number

Ap	0 to 7 inches. Black (10YR 2/1 moist) gritty silt loam; friable; fine granular to cloddy; boundary
4883	abrupt.
A21	7 to 11 inches. Mixed colors, approximately 85 percent dark gray brown (10YR 4/2 moist) and 15 percent
4884	very dark gray (10YR 3/1 moist); crushed color very dark gray (10YR 3/1 moist); gritty silt loam; friable; moderate fine platy structure; contains many prominent worm casts; boundary gradual.
A22	11 to 15 inches. Dark gray brown (10YR 4/2 moist) with few fine faint dark brown (10YR 4/3 moist)
4885	mottles; crushed color olive brown (2.5Y 4/3 moist); heavy loam to light clay loam; friable to slightly firm; weak fine subangular blocky structure; few worm casts; boundary gradual.
B21	15 to 19 inches. Dark gray brown to brown (10YR 4/2 to 5/3 moist) with common fine distinct dark



SOIL SURVEY LABORATORY Lincoln, Nebr. 1/27/58

SOIL TYPE \*Lourdes loam LOCATION Howard County, Iowa

SOIL NOS. S56Iowa-45-7-(1-10) LAB. NOS. 4905-4914

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a VERY COARSE SAND 2.1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (19mm)	
0-7	Ap	1.3	6.6	7.1	10.2	4.4	50.7	19.7	30.9	28.4	-	s11
7-11	A21	1.5	5.2	5.5	7.6	4.2	54.3	21.7	30.4	31.9	-	s11
11-15	A22	1.6	5.6	6.2	9.7	6.7	43.2	27.0	29.4	25.8	-	cl

Soil type: \*Iowides loam  
 Soil No.: S56Iowa-45-7-(1-10)  
 Location: Approximately 410 feet north and 195 feet west of southeast corner of Sec. 33, T99N, R13W, Howard County, Iowa.  
 Vegetation or crop: Red clover and timothy seeding.  
 Parent material: Firm Iowan till with silty overburden.  
 Physiographic position: Crest of low convex ridge on upland about 3/4 to 1 mile from stream.  
 Topography: Gently undulating.  
 Slope: 3 percent.  
 Drainage: Moderately well drained.  
 Ground water: None observed within 66 inches; during wet periods there appears to be a perched water table above the firm till.  
 Permeability: Very slow for the firm till and moderate for the overburden.  
 Moisture: Slightly moist.  
 Stoniness: Some pebbles occur through the firm till, a band of pebbles is concentrated just above the firm till and the silty material above this is usually pebble free.  
 Described by: L. E. Tyler, October 15, 1956.

Horizon and  
 Lincoln  
 Lab. Number

Ap 0 to 7 inches. Black (10YR 2/1 moist) gritty silt loam; crushed color black to very dark gray (10YR 2.5/1 moist); friable; moderate fine granular structure; boundary abrupt.

A21 7 to 11 inches. Mixed very dark gray (10YR 3/1 moist) and dark gray brown (10YR 4/2 moist) with common medium distinct yellowish brown (10YR 5/6 moist) mottles; crushed color dark gray brown (10YR 4/2 moist); gritty silty loam; friable; weak, very fine platy structure; worm casts present; boundary gradual.

A22 11 to 15 inches. Dark gray brown (10YR 4/2 moist) with common fine distinct yellowish brown (10YR 5/6 moist) mottles; crushed color dark brown to brown (10YR 4/3 moist); light clay loam; friable; moderate very fine to fine subangular blocky structure; worm casts present; pebble band commences at base of this horizon; boundary gradual.

IIB21 15 to 20 inches. Ped surfaces dark gray (10YR 4/1 moist) with many medium prominent strong brown (7.5YR 5/6 moist) mottles; crushed color dark yellowish brown to yellowish brown (10YR 4/6 to 5/6 moist); light to medium clay loam; slightly firm to firm; moderate to strong very fine subangular blocky structure; pebble band through this horizon; boundary clear.

IIB22 20 to 26 inches. Prism surfaces dark gray (2.5Y 4/1 moist) with few medium faint dark brown to brown (10YR 4/3 moist) mottles; block coatings same base color with common medium distinct dark brown to brown (7.5YR 4/2 to 4/4 moist) mottles; ped interiors mixed strong brown (7.5YR 5/6 moist) and dark gray (2.5Y 4/1 moist); crushed color yellowish brown (10YR 5/6 moist); medium clay loam; firm to very firm; moderate medium prismatic structure breaking to strong medium angular blocky; very dark gray (N 3/0 moist) coats of transported clay; boundary gradual.

IIB23 26 to 33 inches. Ped surfaces dark gray (2.5Y 4/1 moist) with common medium distinct dark brown to brown (10YR 4/3 moist) mottles; ped interiors are mixed dark gray (2.5Y 4/1 moist) and yellowish brown (10YR 5/6 moist); crushed color yellowish brown (10YR 5/5 moist); medium clay loam; firm to very firm; moderate medium to coarse prismatic structure breaking to moderate coarse angular blocky; very dark gray (N 3/0 moist) transported clay present in root channels and as network on peds; boundary diffuse.

IIB3 33 to 38 inches. Ped surfaces dark gray to gray (5Y 4.5/1 moist) with common medium distinct yellowish brown (10YR 5/4 moist) mottles; ped interiors mixed yellowish brown (10YR 5/6 moist) and gray (2.5Y 5/1 moist); crushed color yellowish brown (10YR 5/4 moist); medium clay loam; firm to very firm; weak medium to coarse prismatic structure breaking to weak coarse blocky; very dark gray (N 3/0 moist) transported clay in streaks on ped surfaces and in root channels; root channels generally smaller than in above horizon; this horizon and all above are leached; boundary clear.

IIC11 38 to 46 inches. Gray (5Y 5/1 to 6/0 moist) vertical cleavage faces with transported clay streaks dark gray (N 3/0 to 4/0 moist) color; interiors mixed dark yellowish brown (10YR 4/4 to 4/6 moist) and dark gray (2.5Y 4/1); crushed color yellowish brown (10YR 5/5 moist); light to medium clay loam; firm; weak coarse prismatic structure; a few large root channels filled with very dark gray (N 3/0 moist) transported clay; unleached horizon; boundary diffuse.

IIC12 46 to 56 inches. Mixed colors, approximately 60 percent dark brown to brown (10YR 4/3 moist) and 40 percent gray (5Y 5/1 moist); crushed color dark yellowish brown to yellowish brown (10YR 4.5/4 moist); light to medium clay loam; firm; mostly massive but some vertical faces of the same color as those in above horizon; transported clay as in above horizon but less of it; unleached; boundary diffuse.

SOIL SURVEY LABORATORY Lincoln, Nebr. Sept., 1963

SOIL TYPE Macksburg LOCATION Adair County, Iowa  
silty clay loam

SOIL NOS. S61Iowa-1-1 LAB. NOS. 16379-16390

Soil type: Macksburg silty clay loam

Soil No.: S61low-1-1

Location: 663 feet south and 678 feet east of NW corner of NE1/4 Sec. 22, T74N, R31W, Adair County, Iowa.

Vegetation: Clover field.

Parent material: Wisconsin loess.

Physiographic position: Moderately wide upland divide. Appears to be highest elevation within the watershed.

Slope: About 1 percent.

Drainage: Imperfectly drained.

Permeability: Moderately slow.

Ground water: Water table at 24 inches.

Moisture: Very moist.

Described by: R. I. Møller, October 12, 1961.

Horizon and  
Lincoln Lab. No.

A1p 0 to 7 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam, dark gray (10YR 4/1) when dry; weak medium subangular blocky breaking to weak fine granular structure; friable to firm<sup>2</sup>; kneaded color approaches very dark brown (10YR 2/2) in color; common wormholes and casts; abrupt smooth boundary.

A12 7 to 14 inches. Mixed black (10YR 2/1) and very dark brown (10YR 2/2) light silty clay loam, dark gray (10YR 4/1) when dry; moderate very fine granular structure; friable; majority of peds are black (10YR 2/1) with very few very dark brown (10YR 2/2) peds; moist color value slightly lower and dry chroma slightly lower than above horizon; very few very fine hard concretions of an oxide; common wormholes and casts; gradual smooth boundary.

A3 14 to 20 inches. Very dark brown (10YR 2/2) medium silty clay loam, gray (10YR 5/1) when dry; weak fine subangular blocky structure breaking to moderate fine granular; friable; kneaded color is very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2); many fine and very fine imbed tubular pores; few to common fine hard concretions of an oxide; common wormholes and few very dark grayish brown (10YR 3/2) worm casts; gradual smooth boundary.

B1 20 to 25 inches. Mixed very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) medium silty clay loam; grayish brown (10YR 5/2) when dry; moderate very fine subangular blocky structure; friable to firm; kneaded color is very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2); many fine and very fine imbed tubular pores; few very fine hard concretions of an oxide; few wormholes and dark grayish brown (10YR 4/2) worm casts; clear smooth boundary.

B2 25 to 30 inches. Dark grayish brown (10YR 4/2) and brown (10YR 5/3) to light olive brown (2.5Y 5/3) medium to heavy silty clay loam; weak medium prismatic breaking to moderate fine subangular blocky structure; firm; ped exteriors are dark grayish brown (10YR 4/2); ped interiors are brown (10YR 5/3) to light olive brown (2.5Y 5/3) with few fine faint yellowish brown (10YR 5/4) mottles; few very dark gray (10YR 3/1) coatings on prism faces; common fine and very fine imbed tubular pores; thin continuous clay films on ped surfaces; few fine hard and few fine soft concretions of an oxide; gradual smooth boundary.

B22 30 to 36 inches. Mixed dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2) medium to heavy silty clay loam; weak medium prismatic breaking to moderate fine subangular blocky structure; firm; few very dark gray (10YR 3/1) stains on some ped exteriors; common fine faint dark yellowish brown (10YR 4/4) grading to distinct yellowish brown (10YR 5/4) mottles; kneaded color is grayish brown to light olive brown (2.5Y 5/3); common fine and very fine imbed tubular pores; thin continuous clay films on peds, very few fine vertical orientated clay fills in pores; common fine soft and few fine hard concretions of an oxide; gradual wavy boundary.

B23 36 to 43 inches. Olive gray (5Y 5/2) medium silty clay loam; weak medium to coarse prismatic breaking to moderate medium subangular blocky structure; firm; common fine distinct dark brown (10YR 3/3) and yellowish brown (10YR 5/4) mottles; faint horizontal band of strong brown (7.5YR 5/6) color; kneaded color is grayish brown to light olive brown (2.5Y 5/3); common fine and very fine imbed tubular pores; very thin continuous clay films on prism faces but discontinuous on ped faces; few very fine very dark gray (10YR 3/1) vertical orientated clay fills in pores; many fine hard and few fine soft concretions of an oxide; gradual smooth boundary.

B3 43 to 51 inches. Olive gray (5Y 5/2) medium to light silty clay loam; weak coarse prismatic breaking to weak medium to coarse subangular blocky structure; firm; few fine distinct dark brown (10YR 3/3) mottles, faint vertical streaks of strong brown (7.5YR 5/6); kneaded color is light olive brown (2.5Y 5/4); many fine and very fine pores; thin discontinuous clay films on prism faces; large open voids and pores free of clay; many very fine hard and few fine soft concretions of an oxide; diffuse wavy boundary.

C1 51 to 60 inches. Olive gray (5Y 5/2) light silty clay loam; massive with distinct vertical cleavage; firm; many fine and medium distinct yellowish brown (10YR 5/4) grading to dark yellowish brown (10YR 4/4) mottles; faint vertical streaks of strong brown (7.5YR 5/6) extending from above horizon; kneaded color is light olive brown (2.5Y 5/4); many fine and medium imbed tubular pores and common open spherical and tubular-shaped voids 5 to 10 mm. in diameter; very thin discontinuous clay films on some prism faces, pores and open voids free of clay flows; many fine soft and very few hard concretions of an oxide; diffuse wavy boundary.

C2 60 to 69 inches. Same as above horizon except for few fine distinct dark brown (10YR 3/3) mottles and absence of clay films on cleavage faces.

C3 69 to 77 inches. Olive gray (5Y 5/2) light silty clay loam; massive with some vertical cleavage; firm; many medium to coarse prominent strong brown (7.5YR 5/6) segregations and common fine distinct yellowish brown (10YR 5/6) mottles; kneaded color is light olive brown (2.5Y 5/4); many fine and very fine imbed tubular pores; no clay flows or clay films on cleavage faces; horizon lacks open voids that are present in above horizons; many fine soft and few very fine hard concretions of an oxide; clear smooth boundary.

C4 77 to 87 inches. Light olive gray (5Y 6/2) silt loam; massive with some vertical cleavage; firm; few to common fine distinct yellowish brown (10YR 5/4) mottles; few fine segregations of strong brown (7.5YR 5/6) grading to reddish brown (5YR 4/4) in places; many fine and very fine imbed tubular pores; few very dark gray (10YR 3/1) clay fills in pores; common coarse soft concretions of an oxide.

Notes: Roots plentiful at 0 to 14 inches; common from 14 to 25, few from 25 to 51 and nearly absent below 51 inches. Clay fills in pores absent from 51 to 77 inches. Distinct open voids from 5 to 10 mm. in diameter from 51 to 77 inches. Increase in oxides below 43 inches. Oxides are spherical in shape, dark brown to black in color, and considered to be predominantly composed of iron-manganese. Strong brown (7.5YR 5/6 to 5/8) which occurs as segregations, horizontal bands, and vertical streaks, is considered to be higher in iron oxide than the associated matrix.

<sup>1</sup>/Munsell color for moist soil.

<sup>2</sup>/Consistence at moist field conditions.

# SOIL SURVEY LABORATORY Beltsville, Md.

SOIL TYPE Macsburg LOCATION Adair County, Iowa  
 silty clay loam

SOIL NOS. 855Iowa-1-1 LAB. NOS. 56198 - 56213

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	2.1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	
0-6	A1p	0.1	0.1	0.4	0.4	0.4	1.1	66.1	31.5	34.1	33.3	
6-9	A12	0.1	0.3	0.3	0.4	0.9	63.9	34.1	31.8	33.2		
9-12	A12	0.1	0.3	0.3	0.4	1.0	63.3	34.6	32.6	31.9		
12-15	A12	0.1	0.3	0.3	0.4	0.9	63.0	35.0	31.5	32.6		
15-18	A3B1	0.2	0.3	0.3	0.3	0.9	62.6	35.4	31.1	32.6		
18-21	B21	0.1	0.3	0.2	0.3	1.1	61.8	36.2	31.1	32.0		
21-24	B22	-	0.3	0.2	0.2	1.2	60.5	37.6	30.0	31.8		
24-28	B22	-	0.1	0.1	0.2	1.3	60.5	37.8	30.1	31.8		
28-33	B3	-	0.2	0.2	0.3	1.4	61.7	36.2	31.6	31.7		
33-38	B3	-	0.1	0.2	0.3	1.5	64.1	33.8	32.5	33.3		
38-43	B3	-	0.1	0.2	0.3	1.4	66.6	31.4	35.6	32.6		
43-49	C1	-	0.1	0.2	0.4	1.5	66.0	31.8	34.5	33.2		
49-55	C1	-	-	0.1	0.4	2.0	67.2	30.3	37.7	31.7		
55-61	C1	-	0.1	0.1	0.4	1.9	66.6	30.9	38.1	30.7		
61-66	C1	-	0.1	0.2	0.5	1.4	67.4	30.4	34.4	34.7		
66-72	C1	-	0.1	0.2	0.3	1.7	69.5	28.2	38.0	33.4		
PH		ORGANIC MATTER				EST% SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC-103 MILLIMHOS PER CM @25°C.	MOISTURE TENSIONS				
8C1a	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N			CaCO3 equiv- alent	GYP SUM mg./100g SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1			%	%				%		%	%	
5.4			2.40	.202	11.9							
5.5			2.29	.194	11.8							
5.7			2.07	.176	11.8							
5.7			1.72	.156	11.0							
5.7			1.52	.136	11.2							
5.8			1.21	.112	10.8							
5.6			0.90	.086	10.5							
5.6			0.67	.068	9.8							
5.7			0.46	.048	9.6							
5.7			0.35	.043	8.1							

Soil type: Macksburg silty clay loam

Soil No.: 855Iowa-1-1

Location: Greenfield Quadrangle; southeast quarter of northeast quarter of Sec. 13, T76N, R32W, Adair County, Iowa.

Slope: 0 percent.

Collected by and date: R. B. Daniels and F. J. Carlisle, November 3, 1955.

Horizon and Beltsville Lab. Number	Sample Depth	
Alp 56198	0-6	0 to 6 inches. Black (10YR 2/1) friable, massive, light silty clay loam; abrupt to A12.
A12 56199 56200 56201	6-9 9-12 12-15	6 to 15 inches. Black (10YR 2/1.5) which crushes to very dark gray (10YR 3/1.5), weak to moderate granular, friable, light silty clay loam; gradual to A3B1.
A3B1 56202	15-18	15 to 18 inches. Mixed very dark gray brown (10YR 3.5/2) and black (10YR 2/1.5) weak to moderate subangular blocky, friable, silty clay loam; gradual to B21.
B21 56203	18-21	18 to 21 inches. Dark gray brown (10YR 4/2) with mixing of very dark gray (10YR 3/1.5), moderate fine subangular blocky, moderately friable, medium to heavy silty clay loam; thin continuous to nearly continuous clay skins; gradual to B22.
B22 56204 56205	21-24 24-28	21 to 28 inches. Dark gray brown (10YR 4/2), weak medium subangular blocky, moderately friable, heavy silty clay loam; continuous thin to moderate clay skins; gradual to B3.
B3 56206 56207 56208	28-33 33-38 38-43	28 to 43 inches. Dark gray brown (10YR 4/2.5) with few fine distinct mottles of grayish brown (2.5Y 5/2), weak medium blocky, moderately friable, silty clay loam; peds are arranged in weak to moderate, medium to coarse prisms which are coated with dark gray brown (2.5Y 4/2) extremely thin silt grains; thin discontinuous clay skins can be seen between silt grains; gradual to C1.
C1 56209 56210 56211 56212 56213	43-49 49-55 55-61 61-66 66-72	43 to 72 inches. Dark gray brown (10YR 4/2.5) with common distinct yellowish brown to strong brown and gray brown (2.5Y 5/2) mottles, moderate coarse prismatic, friable to moderately friable, light silty clay loam; thin discontinuous clay skins of dark gray brown (10YR 4/2) on vertical prism faces.

## SOIL SURVEY LABORATORY Beltsville, Md.

SOIL TYPE Blackburg LOCATION Adair County, Iowa  
silty clay loamSOIL NOS. S55Iowa-1-2 LAB. NOS. 56214 - 56231

		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										341		TEXTURAL CLASS
DEPTH INCHES	HORIZON	1B1a											> 2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002				
0-7	A1p	0.2	0.4	0.3	0.4	0.9	65.2	32.6	34.3	32.0				
7-10	A12	-	0.2	0.2	0.4	1.2	62.5	35.5	32.7	31.2				
10-13	A12	0.1	0.3	0.2	0.4	1.0	61.9	36.1	30.7	32.4				
13-16	A12	0.3	0.3	0.2	0.4	0.7	62.1	36.0	30.8	32.3				
16-19	A3	0.1	0.4	0.2	0.4	0.9	61.7	36.3	31.0	31.8				
19-22	B21	0.1	0.2	0.2	0.3	0.9	61.1	37.2	29.9	32.2				
22-25	B21	-	0.1	0.2	0.3	1.0	60.1	38.3	29.3	32.0				
25-29	B22	-	0.1	0.1	0.3	1.1	60.6	37.8	30.6	31.3				
29-33	B22	-	-	0.1	0.2	0.9	62.5	36.3	30.1	33.4				
33-36	B3	-	-	-	0.1	1.3	63.6	35.0	33.9	31.1				
36-39	B3	-	0.1	0.1	0.3	1.0	64.6	33.9	34.6	31.2				
39-42	B3	-	0.1	0.2	0.4	1.2	65.5	32.6	34.1	32.8				
42-46	B3	-	0.1	0.1	0.4	1.1	66.5	31.8	34.0	33.9				
46-50	C1	-	-	0.1	0.3	1.0	67.1	31.5	34.1	34.2				
50-54	C1	-	0.1	0.1	0.3	1.5	66.0	32.0	35.0	32.7				

Soil type: Macksburg silty clay loam

Soil No.: S55Iowa-1-2

Location: Greenfield Quadrangle; southwest quarter of northwest quarter of southwest quarter of Sec. 17, T76N, R31W, Adair County, Iowa.

Slope: 0 percent.

Collected by and date: R. B. Daniels and F. J. Carlisle, November 5, 1955.

# Horizon and

Beltsville Sample  
Lab. Number Depth

Alp		0 to 7 inches. Black (10YR 2/1) cloddy, which breaks to fine granular, friable, light silty clay loam; clear to A12.
56214	0-7	
A12		7 to 16 inches. Black (10YR 2/1) weak fine and medium granular, friable, light silty clay loam; gradual to A3.
56215	7-10	
56216	10-13	
56217	13-16	
A3		16 to 19 inches. Black (10YR 2/1.5) with a minor amount of very dark gray brown (10YR 3/2)

to B21.

B21		19 to 25 inches. Very dark gray brown (10YR 3/2) with some mixing of very dark gray (10YR 3/1), weak fine subangular blocky, friable, medium to heavy silty clay loam; continuous thin clay skins; gradual to B22.
56219	19-22	
56220	22-25	
B22		25 to 33 inches. Dark gray brown (10YR 4/2.5) with a small amount of very dark brown (10YR 2/2), moderate fine subangular blocky, slightly firm, medium to heavy silty clay loam; thin continuous clay skins; few fine faint gray and browner mottles in lower part of horizon; gradual to B3.
56221	25-29	
56222	29-33	
B3		33 to 46 inches. Dark gray brown (10YR 4/2) with many distinct gray brown (2.5Y 5/2) and strong brown to brown mottles; weak to moderate, medium blocky, slightly firm, silty clay loam; thin continuous clay skins coating larger aggregates which are arranged weak medium to coarse prisms; gradual to C1.
56223	33-36	
56224	36-39	
56225	39-42	
56226	42-46	
C1		46 to 72 inches. Mottled gray brown (2.5Y 5/2) and strong brown to dark brown in fine to medium pattern, massive, friable, light silty clay loam with thin to moderate clay skins on vertical faces of cleavage planes; common fine dark oxide accumulation.
56227	46-50	
56228	50-54	
56229	54-60	
56230	60-66	
56231	66-72	



SOIL SURVEY LABORATORY Lincoln, Nebr. Sept., 1963

SOIL TYPE Macksburg LOCATION Madison County, Iowa  
silty clay loam

SOIL NOS. S61Iowa-61-1 LAB. NOS. 16343-16354

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1b	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-6	A1p	0.2a	0.4a	0.4a	0.5a	0.9a	65.0	32.6	29.6	36.5	-	
6-12	A12	0.2a	0.4a	0.4a	0.5a	0.7a	61.8	36.0	27.3	35.4	-	
12-18	A3	0.2a	0.6a	0.4a	0.5a	0.7a	60.3	37.3	26.3	35.0	-	
18-24	B1	0.4a	0.6a	0.4a	0.4a	0.6a	58.8	38.8	24.6	35.0	-	
24-30	B21	0.3a	0.4a	0.3a	0.5a	0.6a	58.1	39.8	24.4	34.6	-	
30-36	B22	0.1a	0.3a	0.2a	0.6a	0.6a	59.4	38.8	25.8	34.6	-	
36-42	B23	0.1a	0.5a	0.3a	0.7a	0.7a	62.5	35.2	27.6	36.1	-	
42-52	B31	0.1a	0.3a	0.2a	0.5a	0.9b	64.3	33.7	29.2	36.3	-	
52-62	B32	0.1a	0.1a	0.1a	0.3a	0.9b	64.7	33.8	32.5	33.3	-	
62-73	C1	-	0.1a	0.1a	0.3a	0.9b	67.9	30.8	34.8	34.1	-	
73-83	C2	0.1a	0.2a	0.2a	0.5a	1.0b	69.3	28.7	35.4	35.2	-	
83-90	C3	0.1a	0.1a	0.2a	0.5a	1.2b	69.4	28.5	35.2	35.7	-	
8C1a		Organic Matter					Bulk Density			Moisture Retention		
	CaCO <sub>3</sub>	6A1a	6B1a							4B1b	4C1	4B2

Soil type: Macksburg silty clay loam

Soil No.: S61Iowa-61-1

Location: 783 feet west and 390 feet north of southeast corner of Sec. 31, T75N, R28W, Madison County, Iowa.

Vegetation: Plowed meadow field.

Parent material: Wisconsin loess.

Physiographic position: Upland ridge on top of an interfluvium with slope slightly convex toward the northwest.

Slope: About 1 percent.

Drainage: Imperfectly drained.

Permeability: Moderately slow.

Ground water: Water table at 48 inches.

Moisture: Very moist.

Described by: D. F. Slusher, October 9, 1961.

# Horizon and

Lincoln Lab. No.

A1p 0 to 6 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam, dark gray (10YR 4/1) when dry; weak fine and medium subangular blocky structure; firm<sup>2</sup>; a few worm casts; abrupt smooth boundary.

A12 6 to 12 inches. Black (10YR 2/1) light silty clay loam, dark gray (10YR 4/1) when dry; weak fine subangular blocky breaking to moderate fine granular structure; friable; kneaded color the same; moist color value slightly lower and dry chroma slightly lower than the above horizon; few fine lined tubular pores; few very

A3 12 to 18 inches. Black (10YR 2/1) and very dark brown (10YR 2/2) light silty clay loam, gray (10YR 5/1) when

SOIL SURVEY LABORATORY Lincoln, Nebr. Sept., 1963SOIL TYPE Mahaska LOCATION Keokuk County, Iowa  
silty clay loamSOIL NOS. S61Iowa-54-1 LAB. NOS. 16273-16283

DEPTH INCHES	HORIZON	1B1b	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	Textural Class
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY				> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002			
0-7	A1p	0.2	0.5	0.6	0.6	0.7	67.5	29.9	27.8	40.7	-	-	
7-13	A12	0.3	0.4	0.7	0.6	0.5	64.3	33.2	24.8	40.3	-	-	
13-18	A3	0.9	0.9	0.5	0.5	0.5	60.5	36.2	23.4	37.8	-	-	
18-24	B1	0.4	0.8	0.4	0.4	0.6	57.8	39.6	22.1	36.5	-	-	
24-30	B21	0.1	0.2	0.3	0.4	0.8	56.3	41.9	22.7	34.6	-	-	
30-40	B22	0.2	0.6	0.4	0.4	0.9	61.1	36.4	20.0	33.2	-	-	

Soil type: Mahaska silty clay loam

Soil No.: S61Iowa-54-1

Location: 965 feet south and 278 feet east of NW corner of NE1/4 Sec. 34, T77N, R10W, Keokuk County, Iowa.

Vegetation: Clover field.

Parent material: Wisconsin loess.

Physiographic position: Upland ridge on top of an interfluvium with slope slightly convex toward the southeast.

Slope: About 0.75 percent.

Drainage: Imperfectly drained.

Fertility: Moderately low.

Ground water: Water table at 85 inches.

Moisture: Slightly moist.

Described by: D. F. Slusher, October 2, 1961.

# Horizon and

## Lincoln Lab. No.

Alp 0 to 7 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam, dark gray (10YR 4/1) when dry; moderate fine angular blocky and subangular blocky structure; friable to slightly firm<sup>2</sup>; kneaded color black (10YR 2/1) to very dark brown (10YR 2/2); a few worm casts; abrupt smooth boundary.

A12 7 to 13 inches. Black (10YR 2/1) light silty clay loam, dark gray (10YR 4/1) when dry; moderate fine subangular blocky breaking to moderate fine granular structure; friable; a very few medium imbed tubular pores; clear smooth boundary.

A3 13 to 18 inches. Very dark gray (10YR 3/1) to black (10YR 2/1) light silty clay loam, dark gray (10YR 4/1) when dry; moderate fine subangular blocky structure; friable; few fine hard concretions of an oxide; very few fine imbed tubular pores; gradual smooth boundary.

B1 18 to 24 inches. Very dark gray (10YR 3/1) and dark grayish brown to olive brown (2.5Y 4/3) medium silty clay loam, gray (10YR 5/1) when dry; weak medium prismatic breaking to moderate fine subangular blocky and very fine subangular blocky structure; friable; ped exteriors are very dark gray (10YR 3/1) with common fine distinct grayish brown (10YR 5/2) mottles; ped interiors are dark grayish brown to olive brown (2.5Y 4/3); kneaded color very dark grayish brown (10YR 3/2); very few fine imbed tubular pores; many fine hard concretions of an oxide at 18 to 24 inches; gradual smooth boundary.

B21 24 to 30 inches. Dark gray (10YR 4/1) and grayish brown to light olive brown (2.5Y 5/3) heavy silty clay

16277 loam; weak fine prismatic breaking to moderate fine subangular blocky structure; friable to firm; ped exteriors are dark gray (10YR 4/1) with common fine distinct grayish brown (2.5Y 5/2) mottles; ped interiors are grayish brown to light olive brown (2.5Y 5/3) with common fine distinct yellowish brown (10YR 5/8) mottles inside peds; some faint coatings of silt grains partially imbedded in peds; kneaded color dark grayish brown to olive brown (2.5Y 4/3); few fine imbed tubular pores; few thin discontinuous very dark gray (10YR 3/1) clay films on ped surfaces; few fine hard concretions of an oxide; gradual smooth boundary.

B22 30 to 40 inches. Dark gray (10YR 4/1) and grayish brown (2.5Y 5/2) medium silty clay loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; firm; prism faces have faint coatings of silt grains partially imbedded in peds--coatings more distinct than in B21; few oxide stains on ped exteriors; few fine distinct yellowish brown (10YR 5/6) mottles; mottles more common in interior of peds and are few medium prominent brown to dark brown (7.5YR 4/4) in color; kneaded color grayish brown to light olive brown

common fine hard concretions of an oxide; gradual smooth boundary.

B31 40 to 51 inches. Olive gray (5Y 5/2) and light olive gray (5Y 6/2) light to medium silty clay loam; weak medium prismatic structure; firm; ped exteriors are olive gray (5Y 5/2); ped interiors are light olive gray (5Y 6/2); common medium and fine prominent yellowish brown (10YR 5/6) mottles throughout peds but less com-

16279

# SOIL SURVEY LABORATORY Lincoln, Nebr. Sept., 1963

SOIL TYPE Mahaska LOCATION Washington County, Iowa  
silty clay loam

SOIL NOS. S61Iowa-92-2 LAB. NOS. 16318-16330

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1b	3A1								2A2	
		VERY COARSE SAND 2.1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-8	A1p	0.2	0.4	0.4	0.4	0.5	67.3	30.8	28.6	39.4	-	
8-13	A12	-	0.4	0.3	0.4	0.5	63.6	34.8	25.3	39.0	-	
13-17	A3	0.5	0.3	0.2	0.2	0.5	61.7	36.6	25.2	37.1	-	
17-23	B1	0.4	0.5	0.3	0.7	0.3	59.8	38.0	25.6	35.0	-	
23-30	B21	0.2	0.3	0.2	0.9	0.3	59.2	38.9	27.1	33.1	-	
30-35	B22	0.3	0.6	0.4	0.9	0.5	60.9	36.4	28.1	33.9	-	
35-42	B31	0.2	0.4	0.2	0.7	0.5	64.3	33.7	31.5	33.8	-	
42-51	B32	0.1	0.4	0.2	0.7	0.4	65.6	32.6	31.4	35.1	-	
51-55	C1	0.3	0.3	0.2	0.7	0.5	65.3	32.7	30.8	35.5	-	
55-62	C2	0.1	0.1	0.1	0.7	0.6	70.5	27.9	35.1	36.5	-	
62-67	C3	-	0.2	0.2	0.6	0.7	72.1	26.2	36.6	36.6	-	
67-75	C4	0.1	0.1	0.1	0.7	0.4	73.5	25.1	36.9	37.6	-	
75-82	C5	0.1	0.1	0.1	0.7	0.3	73.5	25.2	36.0	38.4	-	
8C1a	6E1b	Organic Matter					Bulk Density			Moisture Retention		
pH	CaCO <sub>3</sub>	6A1a	6B1a	C/N	Field Moist.	30 Cm	A.D.				4B2	
1:1	Equivalent	O.C.	N								15-Bar	
	% a	%	%		% M.	g/cc	% M.	g/cc	g/cc		Sieved	
5.5		2.89	0.235	12							%	13.6
4.9		2.18	0.175	12								14.4
5.0		1.47	0.136	11								15.6
5.0		1.07	0.094	11								16.7
5.0		0.58	0.064	9								17.7
5.2		0.36										17.8
5.5		0.21										15.5
6.0		0.14										15.1
6.7	-	0.16										16.8
6.8	-	0.12										13.9
6.7	-	0.08										13.1
7.0	-	0.05										11.7
7.2	2	0.05										12.9
5A1a	EXTRACTABLE CATIONS						Base Sat.		8D1	8D3	6C1a	
CATION EXCHANGE CAPACITY	6N2b	6O2b	6H1a	6P2a	6Q2a	5A3a	5C1	5C3	Ratio		Ext.	A1
NH <sub>4</sub> OAc	Ca	Mg	H	Na	K	Sum	on NH <sub>4</sub> OAc	on Sum Cations	to Clay NH <sub>4</sub> OAc	Ca/Mg	Iron as Fe	KCl- Ext.
							CEC %	%	CEC		%	me/100g
23.9	13.3	4.4	14.9	0.1	0.5	33.2	76	55	.78	3.0		Tr.
21.7	12.6	4.6	13.9	0.1	0.4	32.6	76	57	.71	3.0		0.1

Soil type: Mahaska silty clay loam

Soil No.: S61Iowa-92-2

Location: 445 feet north and 68 feet west of SE corner of SW1/4 SW1/4 Sec. 22, T76N, R6W, Washington County, Iowa.

Vegetation: Clover and timothy field.

Parent material: Wisconsin loess.

Physiographic position: Upland ridge on top of an interfluvium with slope slightly convex toward the northeast.

Slope: About 2 percent.

Drainage: Imperfectly drained.

Permeability: Moderately slow.

Ground water: Water table at 73 inches.

Moisture: Slightly moist.

Described by: D. F. Slusher, October 5, 1961.

#### Horizon and

#### Lincoln Lab No.

- Alp 0 to 8 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam, dark gray (10YR 4/1) when dry; weak medium subangular blocky breaking to weak very fine granular structure; friable to firm<sup>2</sup>; kneaded color black (10YR 2/1) to very dark brown (10YR 2/2); a few worm casts; clear smooth boundary.
- Al2 8 to 13 inches. Black (10YR 2/1) light silty clay loam, dark gray (10YR 4/1) when dry; weak fine subangular blocky breaking to moderate fine, very fine granular structure; friable; kneaded color black (10YR 2/1); few fine impeded tubular pores; very few fine hard concretions of an oxide; few worm casts; gradual smooth boundary.
- A3 13 to 17 inches. Very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) light silty clay loam, gray (10YR 5/1) when dry; moderate very fine subangular blocky and moderate fine granular structure; friable; ped interiors 10YR 3/2; ped exteriors 10YR 3/1; kneaded color very dark grayish brown (10YR 3/2); very few fine impeded tubular pores; very few fine hard concretions of an oxide; gradual smooth boundary.
- B1 17 to 23 inches. Very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), and dark grayish brown (10YR 4/2) medium silty clay loam, grayish brown (10YR 5/2) when dry; moderate very fine subangular blocky breaking to moderate fine granular structure; majority ped exteriors very dark gray (10YR 3A) with some very dark grayish brown (10YR 3/2) in places; ped interiors dark grayish brown (10YR 4/2) to (2.5Y 4/2); kneaded color very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2) with hue grading to 2.5Y; few fine impeded tubular pores; few fine hard concretions of an oxide; many worm casts, both lighter and darker than matrix colors; gradual smooth boundary.
- B21 23 to 30 inches. Dark grayish brown (2.5Y 4/2) and light olive brown to grayish brown (2.5Y 5/3) heavy silty clay loam; moderate fine subangular blocky breaking to moderate very fine subangular blocky structure; ped exteriors dark grayish brown (2.5Y 4/2); ped interiors light olive brown to grayish brown (2.5Y 5/3); few distinct very dark gray (10YR 3/1) stain streaks on ped exteriors; few fine faint light olive brown (2.5Y 5/6) mottles inside; kneaded color dark grayish brown (2.5Y 4/2); common fine impeded tubular pores; few distinct thin discontinuous clay films on peds; common fine hard concretions of an oxide; gradual smooth boundary.
- B22 30 to 35 inches. Olive gray (5Y 5/2), light olive gray (5Y 6/2) medium silty clay loam; weak fine prismatic breaking to moderate fine subangular blocky structure; firm; ped exteriors olive gray (5Y 5/2); interiors light olive gray (5Y 6/2); mottling variable in degree, consists mainly of common fine distinct strong brown (7.5YR 5/8) segregations, common fine distinct yellowish brown (10YR 5/6), and few fine distinct dark brown to brown (7.5YR 4/4) mottles; common very fine impeded tubular pores; few distinct thin discontinuous dark gray (10YR 4/1) clay films on peds; few fine hard concretions of an oxide; gradual smooth boundary.
- B31 35 to 42 inches. Olive gray (5Y 5/2) and light olive gray (5Y 6/2) medium silty clay loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; firm; ped exteriors olive gray (5Y 5/2); interiors light olive gray (5Y 6/2); common fine faint light olive brown (2.5Y 5/4) mottles; few distinct segregations of strong brown (7.5YR 5/6); common very fine impeded tubular pores; few dark gray (10YR 4/1) clay flows in vertical pores or channels and few thin clay films on prism faces in places; common fine hard concretions of an oxide in association with strong brown colors; gradual smooth boundary.
- B32 42 to 51 inches. Gray (5Y 5/1) and light olive gray (5Y 6/2) light to medium silty clay loam; moderate coarse and medium prismatic structure; firm; ped exteriors gray (5Y 5/1); interiors light olive gray (5Y 6/2); common fine distinct yellowish brown (10YR 5/4) mottles; few distinct segregations of strong brown (7.5YR 5/6) and vertical streaks about 1-inch thick occurring in places; many very fine impeded tubular pores; few distinct thin very dark gray (10YR 3/1) clay films in vertical streaks, some clay flows in pores; frequent spherical clay accumulations; abrupt smooth spherical clay accumulations; abrupt smooth boundary.
- G1 51 to 55 inches. Strong brown (7.5YR 5/6) and gray (5Y 5/1) light silty clay loam; moderate coarse prismatic structure; firm; many very fine impeded tubular pores; common fine very dark gray (10YR 3/1) clay films as streaks in places and in some fine pores; few fine soft concretions of an oxide; strong brown (7.5YR 5/6) occurs as a prominent horizontal band; gradual wavy boundary.
- G2 55 to 62 inches. Gray (5Y 5/1) light silty clay loam; massive with vertical cleavage; firm; many fine prominent yellowish brown (10YR 5/4) mottles; distinct strong brown (7.5YR 5/6) occurring as vertical streaks from above horizon; many very fine impeded tubular pores; common fine thread-like very dark gray (10YR 3/1) clay accumulations in fine pores; few fine hard concretions of an oxide; gradual wavy boundary.
- G3 62 to 67 inches. Gray to light gray (5Y 6/1) silt loam; massive with vertical cleavage; firm; many fine prominent yellowish brown (10YR 5/4) mottles; many fine impeded tubular pores; many fine thread-like clay accumulations in fine pores; diffuse smooth boundary.
- G4 67 to 75 inches. Same as above.
- O5 75 to 82 inches. Strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) silt loam; massive; firm; common fine distinct gray to light gray (5Y 6/1) mottles; strong brown (7.5YR 5/6) occurs as horizontal band; many fine impeded tubular pores; few to common distinct fine clay accumulations in fine pores and vertical channels; clear wavy boundary.
- O6 82 to 86 inches. Gray to olive gray (5Y 6/1) silt loam with light olive brown (2.5Y 5/4) to yellowish brown (10YR 5/4) mottles.

Notes: Roots abundant from 0 to 8 inches, common from 8 to 13, few from 13 to 35, and very few below 35 inches. Clay spherical accumulations about 1/2 inch in diameter with saucer-shaped tops and spherical-shaped bottoms frequent from 42 to 55 inches; connected above and below to vertical streaks of black clay fills. Krotovinas coated with 1/4- to 1/16-inch thick clay films and 1-2 inches wide occur from 48 to 70 inches; interiors partly filled with material similar in color to B horizon. Oxides are spherical in shape, dark brown to black in color and predominantly composed of iron-manganese. Strong brown (7.5YR 5/6 to 5/8) which occurs as segregations, horizontal bands, and vertical streaks, is considered to be higher in iron oxide than the associated matrix.

<sup>1</sup> Munsell color for moist soil. <sup>2</sup> Consistence at moist field conditions.

SOIL SURVEY LABORATORY Lincoln, Nebr. December 1959

SOIL TYPE Marcus LOCATION Clay County, Iowa  
silty clay loam

SOIL NOS. S59Iowa-21-3-(1-8) LAB. NOS. 11135-11142

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							TEXTURAL CLASS
		1B1a	VERY COARSE	COARSE	MEDIUM	FINE	VERY FINE	3A1	

Soil type: Marcus silty clay loam

Soil No.: S59Iowa-21-3-(1-8)

Location: 260 feet north of the northwest corner of the SW1/4 of SW1/4 of Sec. 12, T95N, R38W, and 380 feet east of road center, Clay County, Iowa.

Vegetation and use: Soybeans; cropland.

Slope and land form: Broad level portion of loess-mantled Tazewell till plain. Slope gradient, less than 1 percent.

Drainage: Poorly drained.

Parent material: About 41 inches of very silty, nearly sand-free, material thought to be loess overlying light clay loam, pebbly Tazewell drift.

Collected by: R. E. Jordan and R. L. Juve.

Described by: F. J. Carlisle and R. I. Turner, June 9, 1959.

#### Horizon and

#### Lincoln

#### Lab. Number

- A1p 0 to 7 inches. Black (10YR 2/0.5, 3/1 dry) medium to heavy silty clay loam; weak very fine subangular blocky and fine granular; friable under weak pressure, firm and plastic under strong pressure; indistinct boundary.
- 11135
- A12 7 to 12 inches. Black (10YR 2/0.5, 3/1 dry) medium to heavy silty clay loam; moderate very fine subangular blocky; consistence as above; few to common fine tubular pores; few dark spherical oxide concretions about 2 mm. in diameter; gradual boundary.
- 11136
- A3 12 to 17 inches. Black (10YR 2.5/1, 3.5/1 dry) medium to heavy silty clay loam; structure, consistence, and pore space as in horizon above; a few more dark spherical oxide concretions than above; peds have distinctly shiny surfaces; gradual boundary.
- 11137
- B21 17 to 24 inches. Very dark gray (10YR 3/1, 4/1 dry) medium to heavy silty clay loam; moderate very fine subangular blocky; slightly firmer than horizon above but still quite friable under weak pressure and firm and plastic under strong pressure; oxide concretions and pore space as in horizon above; distinct shiny surfaces on peds; a few hard light gray irregularly shaped carbonate concretions about 1/2 by 1 cm. across are arranged in approximately vertical rows; the soil matrix is noncalcareous; clear wavy boundary.
- 11138
- B22 24 to 30 inches. Very dark grayish brown (2.5Y 3/2) in upper part grading to dark grayish brown (2.5Y 4/2) in lower part, medium silty clay loam; moderate fine and very fine blocky; consistence as in horizon above; fine faint very dark gray and very fine browner mottles; crushed color is 2.5Y 4/2; distinct shiny faces on peds; matrix is predominantly noncalcareous; contains some soft and some firm carbonate segregations as above and some spots 3 to 4 inches in diameter with calcareous matrix; common fine tubular pores; distinct clay films line a few tubular pores 1 to 2 mm. in diameter; gradual boundary.
- 11139
- B31 30 to 35 inches. Grayish brown (2.5Y 4.5/2) medium silty clay loam; moderate fine blocky arranged in weak prisms; slightly firm; contains some dark gray worm casts and a few fine faint 2.5Y 5/4 mottles; calcareous matrix; common carbonate and fine dark oxide concretions; gradual boundary.
- 11140
- B32 35 to 41 inches. Grayish brown (2.5Y 4.5/2) light to medium silty clay loam; weak medium blocky arranged in moderate medium and coarse prisms; slightly firm; prism faces quite uniformly 2.5Y 4.5/2 and ped interiors distinctly and finely mottled with light olive brown to olive yellow; matrix calcareous; abundant light gray (white, dry) carbonate concretions 1 to 2 cm. across with hard centers; clear boundary.
- 11141
- IIC 41 to 55 inches plus. Mottled olive gray (5Y 5.5/2) and dark yellowish brown (10YR 4/4-5/6) light to medium clay loam (approaching gritty silty clay loam); weak medium and coarse prismatic with nearly uniform olive gray prism faces and mottled prism interiors; firm; calcareous; carbonate concretions less abundant than in horizon above; contains some pebbles and coarse sand grains; tubular pores are somewhat larger and more abundant than in horizons B21 and B22.
- 11142

Notes: Colors are of fully moist soil unless indicated otherwise. Only a few roots in this profile. They diminish in numbers gradually from the surface to about 3 feet and are rare below 3 feet. Horizon B21 is probably the layer of maximum clay content but there was uncertainty as to which of the uppermost 4 horizons contains the most clay. Shiny ped faces described in the A3 and B horizons might be very thin patchy clay films but they could not be identified as such with any confidence. Boring showed gritty light silty clay loam from 60 to 90 inches. At 90 inches the material grades to loam high in fine sand with some gravel. At 95 inches fine pebbly light clay loam thought to



December 1959

SOIL TYPE	Marcus silty clay loam	LOCATION	O'Brien County, Iowa
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SOIL NOS. S59Iowa-71-1-(1-8) LAB. NOS. 11153-11160

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										2A2 2 > 2 < 0.075mm	TEXTURAL CLASS
		1B1a						3A1					
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002					
0-7	A1p	<0.1	0.2a	0.2a	0.2b	1.0b	58.1	40.3	29.3	29.9	-	sic/sic	
7-14	A12	<0.1	0.1c	0.2a	0.2a	1.0b	58.7	39.8	29.1	30.7	-	sic/sic	
14-23	A3	0.1c	0.1c	0.2a	0.2a	0.9b	58.4	40.1	28.3	31.1	Tr.	sic/sic	
23-29	B21	<0.1	0.1c	0.1a	0.2a	0.8b	58.9	39.9	26.5	33.3	-	sic/sic	
29-37	B22	<0.1	0.2c	0.1a	0.2a	1.4b	64.2	33.9	33.6	32.1	-	sic	
37-43	B31	<0.1	0.1c	0.1a	0.4a	1.8b	67.5	30.1	39.3	30.3	-	sic	
43-53	B32	0.1d	0.2d	0.2e	0.6e	3.0d	68.5	27.4	43.5	28.4	Tr.	sic/sil	
53-62	C1	1.7d	3.3d	4.0d	6.3d	4.1d	57.9	22.7	41.5	23.5	Tr.	sil	
pH		ORGANIC MATTER					6C1a	Bulk Density			Water Content		
8C1a		6A1a	6B1a		Free	4A1a	4A1c	4A1e	4B1	4B3	4B2		
1:1	1:5	1:10	ORGANIC CARBON	NITRO- GEN	C/N	Iron Fe <sub>2</sub> O <sub>3</sub>	Field- Moist	30-Cm. g/cc	O.D. g/cc	Field- Moist	30-Cm. g/cc	15-Bar g/cc	
6.4			4.57	0.370	12.4	0.6						20.8	
6.7			2.15	0.221	9.7	0.6	1.24	1.21	1.48	27	33	19.7	
7.4			1.36	0.150	9.1	0.6						19.2	
7.6			0.77	0.083	9	0.8	1.37	1.34	1.53	22	26	18.4	
7.7			0.37			0.8						14.4	
7.8			0.27			0.7	1.39	1.37	1.51	21	25	13.3	
8.0			0.19			0.6						12.1	
8.0			0.14			1.1	1.53	1.51	1.59	17	23	10.1	
5A1a	EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH <sub>4</sub> Ac EXCH.	5C3 Base Sat. % on Sum	5B1a Sum Ext.	5A3a Sum Ext.	8D3 Ca/Mg	6E1a CaCO <sub>3</sub> equiv- alent	MOISTURE AT SATU- RATION	
CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K								
← milliequivalents per 100g. soil →						5C1	Cations	Bases	Cations		%	%	
43.9	37.5	11.9	7.1	0.2	0.5	114	88	50.1	57.2	3.2			
40.6	33.7	10.6	4.8	0.1	0.4	110	90	44.8	49.6	3.2	Δ		
38.7	31.9	10.7	2.8	0.1	0.4	111	94	43.1	45.9	3.0	Δ		
32.1	26.2	10.2	2.0	0.1	0.4	115	95	36.9	38.9	2.6	Δ		
26.8	22.5	8.7	2.5	0.1	0.3	118	93	31.6	34.1	2.6	Δ		
24.0	21.1	9.5	1.0	0.1	0.3	129	97	31.0	32.0	2.2	Δ		
21.4				0.2	0.3						7		
17.0				0.2	0.3						10		
a. Common (Fe-Mn?) concr.													
b. Few (Fe-Mn?) concr.													
c. Many (Fe-Mn?) concr.													
d. Few (Fe-Mn?) concr. Few carbonate concr. (CaCO <sub>3</sub> ?).													
e. Common (Fe-Mn?) concr. Few carbonate concr. (CaCO <sub>3</sub> ?).													

Soil type: Marcus silty clay loam  
 Soil No.: 859Iowa-71-1-(1-8)  
 Location: 430 feet north of road center and 355 feet west of the southeast corner of the SW1/4 of Sec. 15, T96N, R39W, O'Brien County, Iowa.  
 Vegetation and use: Corn; cropland.  
 Slope and land form: Level portion of the loess-mantled Tazewell till plain. Slope gradient less than 1 percent.  
 Drainage: Poorly drained.  
 Parent material: About 5 feet of loess overlying Tazewell drift.  
 Collected by: R. H. Jordan and R. L. Juve.  
 Described by: F. J. Carlisle and R. I. Turner, June 10, 1959.

Horizon and  
 Lincoln  
 Lab. Number

- Alp 0 to 7 inches. Black (10YR 2/0.5) medium silty clay loam, estimated 33 percent clay; massive in place, crushing to weak fine granular; friable under weak pressure, slightly firm and plastic under strong pressure; crushed color 10YR 2/1; clear boundary.
- 11153
- A12 7 to 14 inches. Color and texture as above; moderate fine granular; friable under weak pressure, firm and plastic under strong pressure; some fine hard dark spherical oxide concretions; gradual boundary.
- 11154
- A3 14 to 23 inches. Black (10YR 2/1) medium silty clay loam, estimated 36 percent clay; moderate fine and very fine subangular blocky; friable under gentle pressure, firm and plastic under strong pressure; some fine hard dark spherical oxide concretions; some smooth shiny patches on ped faces; rubbed color 10YR 2.4/1; very few visible tubular pores; clear wavy boundary.
- 11155
- B21 23 to 29 inches. Very dark grayish brown (2.5Y 3.4/2) with narrow vertical tongues of very dark gray (10YR 3/1) making up about one-half of the upper part and about one-fourth of the lower part of the horizon, medium silty clay loam, estimated 36 percent clay; moderate fine and very fine subangular blocky; consistence as above; many hard dark spherical oxide concretions; distinct shiny patches on ped faces; common fine and very fine tubular pores; gradual wavy boundary.
- 11156
- B22 29 to 37 inches. Olive gray (5Y 5/2) medium silty clay loam, estimated 34 percent clay; weak fine subangular blocky; friable under gentle pressure, slightly firm and plastic under strong pressure; few fine distinct light olive brown (2.5Y 5/4) mottles and a few narrow vertical tongues of very dark gray that appear to be old worm or root holes; several krotovinas 3 by 3 inches and 4 by 10 inches in outline; a few medium and common fine tubular pores; many dark oxide concretions; gradual boundary.
- 11157
- B31 37 to 43 inches. Olive gray (5Y 5/2) light silty clay loam, estimated 29 percent clay; weak fine subangular blocky; shows horizontal and vertical parting but not prismatic structure; friable; less distinctly mottled than horizon above; many dark oxide concretions; noncalcareous matrix but contains a few white carbonate concretions less than 1 cm. across in the lower part; common medium and fine tubular pores mostly vertical; gradual boundary.
- 11158
- B32 43 to 53 inches. Olive gray (5Y 5/2) heavy silt loam, estimated 27 percent clay, with common conspicuous white carbonate concretions ranging up to 1-1/2 cm. across; massive breaking to medium subangular blocky fragments; friable; common light olive brown (2.5Y 5/4) mottles and many fine dark oxide concretions; calcareous matrix; few coarse and common medium and fine tubular pores, mostly vertical; gradual boundary.
- 11159
- C1 53 to 66 inches (sampled 53 to 62 inches). Olive gray (5Y 5/1.5) with many coarse distinct yellowish brown (10YR 5/6) mottles and many hard carbonate concretions up to 2 cm. across, silt loam; massive friable; calcareous matrix; this horizon is very silty and appears to have been derived primarily from loess; it contains a number of pebbles and a few strong brown tongues of loam texture extend upward from sandy layer below.
- 11160
- IIc2 66 to 84 inches. Light olive brown (2.5Y 5/4) in upper part grading to pale brown (10YR 6/3) below; calcareous medium and fine sand; slightly coherent; soft.
- IIc3 84 to 90 inches plus. Yellowish brown (10YR 5/4 to 5/6) slightly pebbly light to medium clay loam; fine faint mottles of grayer and browner colors; calcareous; presumed to be glacial till.

Notes: Colors are of fully moist soil unless indicated otherwise. Only a few roots in this profile; they diminish in numbers gradually with depth. Shiny ped faces in the A3 and B horizons might be very thin patchy clay films, but they could not be identified as such with any confidence. Material below about 64 inches was examined with a bucket auger but not sampled.

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1959

SOIL TYPE Monona LOCATION Harrison County, Iowa  
silt loam, acid variant

SOIL NOS. S58Iowa-43-1 LAB. NOS. 9566-9572

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										2A2 > 2	TEXTURAL CLASS
		1B1a							3A1				
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002			
0-7	A11	0.1	0.1	<0.1	0.2a	2.6a	73.1	23.9	49.5	26.3	-	s11	
7-10	A12	<0.1	<0.1	<0.1	<0.1	2.6a	73.9	23.5	49.9	26.6	-	s11	
10-16	B21	<0.1	<0.1	<0.1	<0.1	2.2a	73.3	24.5	48.1	27.4	-	s11	
16-24	B22	<0.1	<0.1	<0.1	<0.1	2.3a	73.8	23.9	47.6	28.5	-	s11	
24-42	B3	<0.1	<0.1	<0.1	<0.1	2.4a	73.4	24.2	45.8	30.0	-	s11	
54-70	C1	<0.1	<0.1	<0.1	0.1a	3.1a	76.2	20.6	51.2	28.2	-	s11	
92-105	C2	<0.1	<0.1	<0.1	0.3b	4.2b	80.0	15.5	55.1	29.3	-	s11	
pH		ORGANIC MATTER				Free Iron Fe <sub>2</sub> O <sub>3</sub>	ELECTRI- CAL CONDUCTI- VITY EC-10 <sup>3</sup> MILLIMHOS PER CM @ 25°C.	6E1a		MOISTURE TENSIONS			
8C1a			6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N			CaCO <sub>3</sub> equiv- alent	GYP-SUM mg./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	4B2 15 ATMOS.	
	1:5	1:10	%	%		6C1a		%		%	%	%	
6.0			2.55	0.211	12.1	1.4						11.5	
6.1			1.62	0.144	11.2	1.4						10.5	
6.2			0.90	0.096	9	1.5						10.5	
5.1			0.69	0.074	9	1.6						9.8	
5.3			0.42			1.8						10.4	
6.2			0.19			1.8						9.8	
8.0			0.12			1.4		6				8.6	
5A1a CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH <sub>4</sub> Ac EXCH.	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg	MOISTURE AT SATU- RATION %		
6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K		5C1	< me/100g. soil	< me/100g. soil	< me/100g. soil				
22.9	16.6	4.0	7.4	<0.1	0.5	92	74	21.1	28.5	4.2			
19.1	12.8	3.9	6.6	<0.1	0.4	90	72	17.1	23.7	3.3			
17.8	11.3	4.7	5.7	<0.1	0.4	92	74	16.4	22.1	2.4			
17.1	8.4	4.3	9.0	0.1	0.3	77	59	13.1	22.1	2.0			
17.8	10.7	4.9	7.0	0.1	0.3	90	70	16.0	23.0	2.2			
17.3	11.8	5.0	4.1	0.2	0.4		81	17.4	21.5	2.4			
15.4		5.8	<0.1	0.1	0.4								
a. Few smooth dark brown to black concr. (Fe-Mn)													
b. Trace smooth dark brown to black concr. (Fe-Mn?); few CaCO <sub>3</sub> concr.													

a. Few smooth dark brown to black coner. (Fe-Mn?)

b. Trace smooth dark brown to black coner. (Fe-Mn?); few CaCO<sub>3</sub> coner.

Soil type: Monona silt loam, acid variant

Soil No.: 858Iowa-43-1

Location: 370 feet north and 555 feet east of the south center of Sec. 18, T80N, R42W, Harrison County, Iowa.

Slope: 1 percent.

Vegetation: Oak, walnut, with understory of sparse grass, gooseberry bushes, weeds, and vines. Timber stand has sparse small openings with bluegrass vegetation.

Geomorphic surface: Hatcher.

Collected by and date: G. H. Simonson and R. B. Daniels, July 28, 1958.

# Horizon and

## Lincoln

### Lab. Number

- O2 1 to 0 inch. Very dark gray (10YR 3/1) and dark brown (7.5YR 3/2) decomposed and decomposing leaves and twigs; abrupt to the A1.
- A11 0 to 7 inches. Very dark gray to black (10YR 2.5/1) silt loam; dark gray (10YR 4/1) dry; weak to moderate fine granular; abundant roots; many bleached silt grains apparent when moderately moist to dry; friable; leached post-Farmdale loess; clear to the A12.
- A12 7 to 10 inches. Very dark brown to very dark grayish brown (10YR 2.5/2) silt loam; sparse mixing of very dark gray (10YR 3/1) and brown to dark brown (10YR 4/3); very dark grayish brown (10YR 3/2) crushed; grayish brown (10YR 5/2) dry; weak fine granular; friable; abundant roots; gradual to the B21.
- B21 10 to 16 inches. Dark brown (10YR 3/3) silt loam; brown (10YR 5/3) dry; sparse mixing of very dark grayish brown (10YR 3/2); very dark grayish brown to dark brown (10YR 3/2.5) crushed; abundant light gray (10YR 6/1) patches of bleached silt grains on peds apparent when dry; moderate fine to medium subangular blocky; sparse very dark gray (10YR 3/1) coatings on exteriors of peds; friable; gradual to the B22.
- B22 16 to 24 inches. Brown to dark brown (10YR 4/3) silt loam; dark brown (10YR 3/3) ped coatings; dark yellowish brown (10YR 3/4) crushed; bleached silt grains on peds less prominent than in B21; weak fine and medium subangular blocky; friable; gradual to the B3.
- B3 24 to 42 inches. Dark yellowish brown (10YR 3/4) silt loam; dark yellowish brown (10YR 3/4) crushed; sparse dark brown (10YR 3.5/3) coating on exteriors of prisms; weak medium and coarse prisms breaking to very weak medium blocky; friable; gradual to the C1.
- C1 42 to 90 inches. Brown (10YR 4/3 to 5/3) silt loam; sparse fine indistinct grayer and browner mottles; massive; friable; abrupt to the C2. (Sampled 54 to 70 inches.)
- C2 92 to 105 inches. Brown (10YR 5/3) silt loam; sparse fine indistinct grayer and browner mottles; sparse white carbonate concretions; friable; massive; calcareous post-Farmdale loess.

October 1959

SOIL TYPE Monona LOCATION Harrison County, Iowa  
silt loam, shallow carbonate variant

SOIL NOS. S58 Iowa-43-2 LAB. NOS. 9573-9577

PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1													
DEPTH INCHES	HORIZON	1B1a						SILT	CLAY	0.2-0.02	0.02-0.002	2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	> 2						
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	( $< 9\mu$ )		
0-5	A11	0.1	0.1	<0.1	0.2a	3.4a	73.1	23.1	52.0	24.6	-	sil	
5-10	A12	<0.1	<0.1	<0.1	0.2a	3.3a	72.2	24.3	52.1	23.5	-	sil	
10-16	B2	<0.1	0.1	<0.1	0.1a	3.3a	71.7	24.8	50.6	24.5	Tr.	sil	
16-21	B3	<0.1	0.1	<0.1	0.2a	3.5a	72.0	24.2	52.4	23.2	-	sil	
21-33	C1	<0.1	0.1b	0.1b	0.2b	4.5b	75.3	19.8	55.6	24.3	Tr.	sil	
pH		ORGANIC MATTER				Free Iron	ELECTRICAL CONDUCTIVITY EC-10 <sup>3</sup> MILLIMHOS PER CM 25°C.	6E1a	MOISTURE TENSIONS				
8C1a		6A1a	6B1a			Fe <sub>2</sub> O <sub>3</sub>		CaCO <sub>3</sub> equiv. cent	GYPSUM mg./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.	
	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N	6C1a		%		%	%	%	
7.3			3.09	0.247	12.5	0.8		Δ				13.3	
7.4			1.30	0.112	11.6	0.8		Δ				11.2	
7.4			0.68	0.068	10	0.8		Δ				11.3	
7.5			0.43	0.049	9	0.9		Δ				11.4	
7.9			0.38	0.043	9	0.6		7				8.8	
5A1a	EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH <sub>4</sub> Ac EXCH.	5C3	5B1a	5A3a	8D3			
CATION EXCHANGE CAPACITY	6N2b	6O2b	6H1a	6P2a	6Q2a		Base Sat. % on Sum	Sum Bases	Sum Cations	Ca/Mg	MOISTURE AT SATURATION		
NH <sub>4</sub> Ac	Ca	Mg	H	Na	K								
	milliequivalents per 100g. soil						5C1	Cations	me./100g.				
27.6	24.9	6.0	2.5	<0.1	1.8	118	93	32.7	35.2	4.2			
22.0	17.4	5.6	2.0	<0.1	1.5	111	92	24.5	26.5	3.1			
20.2	15.2	5.7	1.6	<0.1	1.1	109	93	22.0	23.6	2.7			
20.2	16.3	6.3	1.6	<0.1	0.8	116	94	23.4	25.0	2.6			
16.7		5.5	0.4	<0.1	0.5								
a. Few smooth dark brown to black coner. (Fe-Mn?)													
b. Trace smooth dark brown to black coner. (Fe-Mn?); few CaCO <sub>3</sub> coner.													

Soil type: Monona silt loam, shallow carbonate variant

Soil No.: 858Iowa-43-2

Location: 425 feet north of and 212 feet east of south center of Sec. 18, T80N, R42W, Harrison County, Iowa.

Slope: 15 percent convex, west exposure.

Vegetation: Mature oak, walnut, basswood, completely shaded with a good stand of young trees; ground cover mainly weeds.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, July 29, 1958.

#### Horizon and

#### Lincoln

#### Lab. Number

O2	2 to 0 inch. Partially decomposed leaves and bark; abundant fibrous roots of ground cover; fine granular structure in lower part; clear to the A11.
A11 9573	0 to 5 inches. Black to very dark grayish brown (10YR 2.5/1.5) silt loam; gray (10YR 5/1) dry; weak fine granular; abundant roots; friable; leached post-Farmdale loess; gradual to the A12.
A12 9574	5 to 10 inches. Very dark gray (10YR 3/1) silt loam; gray to brownish gray (10YR 5/1.5) dry; sparse to common mixing of very dark grayish brown (10YR 3/2); weak medium subangular blocky breaking to fine granular; friable; common worm casts; clear to B2.
B2 9575	10 to 16 inches. Brown to dark brown (10YR 4/3) silt loam; light brownish gray (2.5Y 6/2) dry; abundant very dark grayish brown (10YR 3/2) ped exteriors; weak fine to medium subangular blocky; friable; gradual to B3.
B3 9576	16 to 21 inches. Brown to dark brown (10YR 4/3) silt loam; sparse very dark grayish brown to dark brown (10YR 3/2 and 10YR 3/3) coatings on ped exteriors; sparse gray brown mottles; weak medium subangular blocky grading toward massive; friable; abrupt to the C1.
C1 9577	21 to 33 inches. Brown (10YR 4.5/3) silt loam; sparse gray and yellowish red (5YR 4/6) mottles; massive; friable; calcareous post-Farmdale loess; few to common tubular lime concretions less than 1 mm. in diameter and a few larger lime concretions.

Notes: The subsoil colors tend toward the 2.5Y hue; they would probably fit a 1Y hue best.

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1959SOIL TYPE Monona LOCATION Harrison County, Iowa  
silt loamSOIL NOS. S58Iowa-43-3 LAB. NOS. 9578-9583

DEPTH INCHES	HORIZON	1B1a	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY				> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.25-0.02	0.02-0.002			
0-4	A11	<0.1	0.1	0.1a	0.2a	3.0a	72.2	24.4	48.4	26.9	-	-	s11
4-10	A12	<0.1	<0.1	<0.1	<0.1	2.6a	71.7	25.7	47.8	26.5	-	-	s11
10-18	B2	<0.1	<0.1	<0.1	0.1	2.9a	71.7	25.3	48.4	26.3	-	-	s11
18-35	B3	<0.1	<0.1	<0.1	0.1	3.3a	73.8	22.8	51.2	26.0	-	-	s11
35-53	C1	0.1	0.1	0.1a	0.2a	4.7a	74.9	19.9	56.0	23.7	-	-	s11
53-62	C2	0.1	0.1	0.1a	0.2a	4.8a	77.1	17.1	57.1	25.1	-	-	s11

Slope: 7 percent convex, southeast exposure.

Vegetation: Mixed oak-walnut timber and bluegrass occupying about equal amounts of the area. The profile site is in a 50-foot square grassy area.

Geomorphic surface: Recent.

Collected by: G. H. Simonson and R. B. Daniels.

#### Horizon and

#### Lincoln

#### Lab. Number

O2	1 to 0 inch. Partially decayed leaves; very abundant fibrous grass roots; mixture of organic and mineral matter in lower part; abrupt to the A11.
A11 9578	0 to 4 inches. Very dark gray (10YR 3/1) silt loam; gray (10YR 5/1) dry; abundant roots; moderate fine granular; friable; leached post-Farmdale loess; clear to the A12.
A12 9579	4 to 10 inches. Very dark grayish brown (10YR 3/2) silt loam; gray (10YR 5/2) dry; dark grayish brown (10YR 4/2) crushed; moderate fine subangular blocky breaking to fine granular; friable; thin discontinuous coatings on peds; common concentrations of bleached silt grains on ped exteriors; clear to the B2.
B2 9580	10 to 18 inches. Dark yellowish brown (10YR 3/4) silt loam; yellowish brown (10YR 5/4) dry; brown to dark brown (10YR 4/3) crushed; weak fine and medium subangular blocky; friable; thin coatings in larger pores; few bleached silt grains on peds; gradual to the B3.
B3 9581	18 to 35 inches. Brown to dark brown (10YR 4/3) silt loam; brown to dark brown (10YR 4/3) crushed; very weak medium and coarse subangular blocky; friable; gradual to the C1.
C1 9582	35 to 53 inches. Brown (10YR 5/3) silt loam; brown (10YR 5/3) dry; sparse grayer and browner mottles; massive; friable; abrupt to the C2.
C2 9583	53 to 63 inches. Brown (10YR 5/3) silt loam; sparse grayer and browner mottles; massive; friable; calcareous post-Farmdale loess.



## October 1959

silt loam

9584-9589

a. Few smooth dark brown to black coner. (Fe-Mn?)  
b. Trace smooth dark brown to black coner. (Fe-Mn?)  
c. Trace smooth dark brown to black coner. (Fe-Mn?); few  $\text{CaCO}_3$  coner.

Soil type: Monona silt loam

Soil No.: 858 Iowa-43-4

Location: 475 feet south and 20 feet west of the northeast corner of the SW1/4 of the SW1/4 of Sec. 7, T8N, R42W, Harrison County, Iowa.

Slope: 2 percent gently convex.

Vegetation: The site is dominantly bluegrass sod but the area in general contains much buckbrush. A few young ash and mulberry trees are scattered within the area.

Geomorphic surface: Millenix.

Collected by and date: G. H. Simonson and R. B. Daniels, August 6, 1958.

# Horizon and

## Lincoln

### Lab. Number

A11 0 to 8 inches. Very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; fine granular; friable; abundant fine grass roots; leached post-Farmdale loess; gradual to the A12.

A12 8 to 12 inches. Very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; sparse mixing of dark brown (10YR 3/3); very dark brown to very dark grayish brown (10YR 2.5/2) crushed; moderate fine granular; friable; gradual to the B2.

B2 12 to 21 inches. Brown to dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; sparse to common very dark grayish brown to dark brown (10YR 3/2 and 10YR 3/3) peds; brown to dark brown (10YR 4/3) crushed; weak fine and medium subangular blocky breaking to weak fine granular; friable; common worm casts; thin discontinuous coatings on peds; gradual to the B3.

B3 21 to 32 inches. Brown to dark brown (10YR 4/3) silt loam; sparse dark brown (10YR 3/3) coatings on peds; weak fine to medium subangular blocky; friable; common worm casts; gradual to the C1.

C1 30 to 62 inches. Brown to dark brown (10YR 4/3) to (10YR 5/3) silt loam; sparse gray and browner mottles; massive; friable; sparse worm casts; abrupt to the C2.

C2 62 to 80 inches. Brown (10YR 5/3) silt loam; sparse fine grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) mottles; massive; friable; calcareous loess.

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1959

SOIL TYPE Monona LOCATION Harrison County, Iowa  
silt loam

SOIL NOS. 858Iowa-43-7 LAB. NOS. 9600-9605

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	1B1a	1B1a	1B1a	1B1a	1B1a	1B1a	1B1a	1B1a	1B1a	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2	
0-5	A11	<0.1	<0.1	<0.1	0.1a	2.4a	75.8	21.7	51.4	26.9	-	s11
5-10	A12	<0.1	<0.1	<0.1	0.2a	3.0a	74.0	22.8	50.1	27.0	-	s11
10-18	B2	<0.1	<0.1	<0.1	0.1a	2.2a	74.4	23.3	49.5	27.2	-	s11
18-26	B3	<0.1	<0.1	<0.1	<0.1	2.6a	75.6	21.8	51.3	26.9	-	s11
34-52	C1	<0.1	<0.1	<0.1	0.2a	4.1a	76.4	19.3	55.0	25.7	-	s11
71-84	C2	<0.1	0.1b	0.1b	0.3c	5.0c	79.1	15.4	60.9	23.4	-	s11
pH		ORGANIC MATTER				Free Iron Fe <sub>2</sub> O <sub>3</sub> %	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM	6E1a CaCO <sub>3</sub> equiv- alent	GYPSUM me./100g. SOIL	MOISTURE TENSIONS		
8C1a	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	6C1a				1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1			%	%				%		%	%	%
6.5			3.43	0.284	12.1	1.4		<1				12.4
6.5			1.56	0.147	10.6	1.6		<1				10.4
6.4			0.66	0.075	9	1.7		<1				9.9
6.5			0.52	0.061	8	1.8		<1				9.5
6.2			0.28			1.6						9.0
8.0			0.13			1.5		8				8.0
5A1a	EXTRACTABLE CATIONS 5B1a					BASE SAT. NH <sub>4</sub> Ac EXCH.	5C3 Base Sat. % on Sum Cations	5B1a Sum	5A3a Sum	8D3 Ca/Mg	MOISTURE AT SATU- RATION	
CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	6N2b Co	6O2b Mg	6H1a H	6P2a Na	6Q2a K	5C1						
	milliequivalents per 100g. soil											
25.0	21.6	4.5	4.0	0.1	0.0	107	85	27.0	21.0	4.8		

Soil type: Monona silt loam

Soil No.: 898Iowa-43-7

Location: 475 feet south and 530 feet west of the northeast corner of the SE1/4 of the SW1/4 of Sec. 5, T79N, R43W, Harrison County, Iowa.

Slope: 7 percent convex, northeast exposure.

Vegetation: Oak, walnut, elm, cedar, understory of buckbrush, gooseberry, and sumac, few small openings of blue-grass sod; some grass is general throughout the area.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, August 7, 1958.

Horizon and

Lincoln

Lab. Number

A1 0 to 5 inches. Black to very dark gray (10YR 2.5/1) silt loam. gray (10YR 5/1) fine nodules fine granular.

- A12 5 to 10 inches. Very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; sparse mixing of very dark grayish brown (10YR 3/2); very dark brown (10YR 2/2) crushed; moderate fine subangular blocky breaking to fine granular; friable; common tree roots; bleached silt grain coatings on peds fairly prominent when dry; gradual to the B2.
- B2 10 to 18 inches. Dark brown (10YR 3.5/3) silt loam, brown to pale brown (10YR 5.5/3) dry; sparse mixing of very dark grayish brown (10YR 3/2); dark brown (10YR 3.5/3) crushed; moderate fine subangular blocky; friable; common tree roots; sparse worm casts; gradual to the B3.
- B3 18 to 26 inches. Brown to dark brown (10YR 4/3) silt loam; sparse mixing of dark brown to very dark grayish brown (10YR 3/3-3/2); weak medium to fine subangular blocky; friable; few tree roots; gradual to the C1.
- C1 26 to 71 inches (sampled 34 to 52 inches). Brown to dark brown (10YR 4/3) silt loam; sparse faint grayer and browner mottles; massive; friable; abrupt to the C2.
- C2 71 to 84 inches. Brown (10YR 5/3) silt loam; sparse faint grayer and browner mottles; massive; friable; calcareous post-Farmdale loess.

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a					3A1					
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			2A2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	> 2	
0-8	A1	<0.1	<0.1	<0.1	0.1a	3.5a	73.8	22.6	53.3	24.1	-	s11
8-16	B2	<0.1	<0.1	<0.1	0.2a	4.4a	72.7	22.7	53.9	23.3	-	s11
16-25	B3	<0.1	0.1b	0.1b	0.2a	4.4a	73.1	22.1	54.0	23.6	-	s11
25-36	C1	0.1b	0.1b	0.1b	0.3a	4.9a	75.4	19.1	56.1	24.4	-	s11
36-50	C2	<0.1	0.1c	0.1c	0.5d	5.3d	78.2	15.8	57.8	26.0	-	s11
pH		ORGANIC MATTER				Free Iron Fe <sub>2</sub> O <sub>3</sub> %	ELECTRI- CAL CONDUCT- IVITY EC-10 <sup>3</sup> MILLIMHOS PER CM 25°C.	6E1a CaCO <sub>3</sub> equiv- alent	GYPSUM mg./100g. SOIL	MOISTURE TENSIONS		4B2 15 ATMOS.
8C1a	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	6C1a		%		1/10 ATMOS.	1/3 ATMOS.	%
1:1			%	%						%	%	%
7.1			2.86	0.247	11.6	1.4		Δ				12.3
7.3			0.85	0.089	10	1.5		Δ				10.2
7.4			0.49	0.057	8	1.6		Δ				10.1
7.6			0.41			1.5		Δ				9.5
7.9			0.19			1.2		6				8.7
5A1a CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	EXTRACTABLE CATIONS					5B1a						MOISTURE AT SATU- RATION %
	Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K							
	milliequivalents per 100g. soil →											
16.9		3.5	3.3	<0.1	1.0							
13.0		3.5	2.0	<0.1	0.7							
11.2		4.0	1.6	<0.1	0.7							
14.1		5.6	1.2	<0.1	0.7							
14.1		5.5	<0.1	<0.1	0.8							
a. Trace smooth dark brown to black concr. (Fe-Mn?)												
b. Common smooth dark brown to black concr. (Fe-Mn?)												
c. Trace smooth dark brown to black concr. (Fe-Mn?); common CaCO <sub>3</sub> concr.												
d. Trace smooth dark brown to black concr. (Fe-Mn?); few CaCO <sub>3</sub> concr.												

Location: 370 feet east of the northwest corner of the NE1/4 of the SE1/4 of Sec. 8, T79N, R43W, Harrison County, Iowa.

Slope: 15 percent, flat transverse to slope, northeast exposure.

Vegetation: Partly timbered bluegrass pasture, about 25 percent stand of oak, walnut, elm, and ash. There are buckbrush, gooseberry bushes, and weeds scattered throughout the area.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, October 8, 1958.

# Horizon and

## Lincoln

### Lab. Number

- A1  
9606 0 to 8 inches. Black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; very dark gray (10YR 3/1) crushed; moderate fine to medium granular; friable; leached post-Farmdale loess; gradual to the B2.
- B2  
9607 8 to 16 inches. Very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; abundant mixing of black (10YR 2/1) and dark brown (10YR 3/3); very dark grayish brown (10YR 3/2) crushed; weak fine subangular blocky; friable; abundant worm casts; gradual to the B3.
- B3  
9608 16 to 25 inches. Dark brown (10YR 3/3) and brown to dark brown (10YR 4/3) silt loam; brown (10YR 5/3) to pale brown (10YR 6/3) dry; brown to dark brown (10YR 4/3) crushed; weak fine to medium subangular blocky; friable; abundant worm casts; gradual to the C1.
- C1  
9609 25 to 36 inches. Brown to dark brown (10YR 4/3) silt loam; brown (10YR 5/3) crushed; massive to very weak medium subangular blocky; friable; common worm casts; leached; abrupt to the C2.
- C2  
9610 36 to 50 inches. Brown (10YR 5/3) silt loam; sparse indistinct grayer and browner mottles; friable; sparse to common worm casts; calcareous post-Farmdale loess.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1961

SOIL TYPE Monona LOCATION Harrison County, Iowa  
silt loam

SOIL NOS. 859Iowa-43-1 LAB. NOS. 12162-12166

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2	
0-5	A1	<0.1	0.1a	0.1a	0.3	3.7	72.7	23.1	56.4	20.2	-	s11
5-9	B2	<0.1	0.1a	0.1a	0.2	3.2	71.5	24.9	53.0	21.8	-	s11
9-14	B3	<0.1	0.1a	0.1a	0.3	3.0	71.9	24.6	52.4	22.7	-	s11
14-24	C1	0.2b	0.2c	0.2c	0.4c	3.3c	75.1	20.6	55.3	23.3	-	s11
38-44	C2	0.1b	0.1b	0.2b	0.4c	3.5c	79.3	16.4	58.7	24.3	-	s11
<hr/>												
pH		ORGANIC MATTER				Free Iron	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM	6B1a CaCO <sub>3</sub> equiv- alent %	GYPSUM mg./100g. SOIL	MOISTURE TENSIONS		
8C1a	1:5	1:10	6A1a ORGANIC CARBON %	6B1a NITRO- GEN %	C/N	Fe <sub>2</sub> O <sub>3</sub> % 6C1a				1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
7.3			5.15	0.374	14	0.8		< 1				15.8
6.6			1.15	0.105	11	0.8		< 1				11.1
7.0			0.78	0.084	9	0.8		< 1				11.2
7.8			0.57	0.064	9	0.8		8				9.7
7.9			0.16			0.7		10				8.7
<hr/>												
5A1a CATION EXCHANGE CAPACITY NH <sub>4</sub> OAc		EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH <sub>4</sub> OAc EXCH.	Base Sat. % on Sum Cations	Sum Ext. Bases	Sum Ext. Cat- ions	Ca/Mg	MOISTURE AT SATU- RATION
		6N2b Ca	6O2b Mg	6H1a H	6P2a No	6Q2a K						
		milliequivalents per 100g. soil					5C1	5C3	5B1a	5A3a	8D3	%
30.9	30.2	5.0	3.2	< 0.1	1.2	118	92	36.4	39.6	6.0		
21.2	15.8	4.9	3.9	< 0.1	0.8	101	85	21.5	25.4	3.2		
20.3	15.8	5.8	2.6	< 0.1	0.6	109	90	22.2	24.8	2.7		
16.7		4.7	< 0.1	< 0.1	0.5							
14.4		4.2	< 0.1	0.1	0.4							

- a. Many Fe-Mn? concr.  
b. Many carbonate concr. CaCO<sub>3</sub>?  
c. Few carbonate concr. CaCO<sub>3</sub>?

Soil type: Monona silt loam

Soil No.: 859Iowa-43-1

Location: 1090 feet east and 360 feet north of the southwest corner of the SW1/4 of the SE1/4 of Sec. 18, T80N, R42W, Harrison County, Iowa.

Slope: 20 percent convex, east exposure, lower part of slope.

Vegetation: Mixed mature white oak, hackberry, and young elm with a thin undergrowth of brush.

Geomorphic surface: Late Wisconsin to Recent.

Collected by and date: G. H. Simonson, September 29, 1959.

# Horizon and

## Lincoln

### Lab. Number

- 02 1 to 0 inch. Partially decayed leaves and twigs; abrupt lower boundary.
- A1 0 to 5 inches. Black to very dark gray (10YR 2.5/1) silt loam, dark gray (10YR 4/1) dry; abundant fibrous roots; moderate fine granular, appears to be primarily worm casts; friable; leached post-Farmdale loess; gradual lower boundary.

B2

5 to 10 inches. Dark grayish brown (10YR 3/1) silt loam; sparse mixing of dark grayish brown (10YR 4/2) in worm casts; very weak medium subangular blocky; calcareous, with abundant carbonate concretions present; diffuse lower boundary.

- B3 9 to 14 inches. Dark grayish brown (10YR 4/2) silt loam; sparse mixing of very dark gray (10YR 3/1) as worm casts; weak medium subangular blocky; friable; common worm casts; sparse gray silt grains on ped exteriors; matrix leached but sparse carbonate concretions are present; abrupt wavy lower boundary.

- C1 14 to 24 inches. Brown (10YR 5/3) silt loam; sparse mixing of dark grayish brown (10YR 4/2) in worm casts; very weak medium subangular blocky; calcareous, with abundant carbonate concretions present; diffuse lower boundary.

- C2 24 to 44 inches (sampled 38 to 44 inches). Brown (10YR 5/3) silt loam; sparse yellowish brown (10YR 5/6) mottles; massive; friable; sparse worm casts; calcareous post-Farmdale loess.



SOIL SURVEY LABORATORY Lincoln, Nebr. August 1961

SOIL NOS. S59 Iowa-43-2 LAB. NOS. 12167-12171

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a									2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002			> 2	
0-4	A1	<0.1	0.1	0.1	0.2	3.4	71.9	24.3	52.0	23.3	-	s11
4-10	B2	<0.1	<0.1	0.1	0.2	3.6	71.6	24.5	51.4	23.9	-	s11
10-15	B3	0.4a	0.2a	0.1a	0.4b	3.3b	77.2	18.4	53.1	27.6	-	s11
18-28	C1	0.2a	0.1a	0.1a	0.3b	4.0b	77.5	17.8	55.7	26.0	-	s11
34-40	C2	0.4a	0.1a	0.1a	0.4b	4.6b	78.2	16.2	58.1	24.9	-	s11
		pH		ORGANIC MATTER		Free Iron	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM	6E1a CaCO <sub>3</sub> equiv- alent	GYPSUM me./100g. SOIL	MOISTURE TENSIONS		
8C1a		1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	Fe <sub>2</sub> O <sub>3</sub> %			1:10 ATMOS.	1/3 ATMOS.	15 ATMOS.
		1:1		%	%		6C1a	%		%	%	%
7.5				3.20	0.261	12	1.2	< 1				13.6
7.6				1.11	0.109	10	1.4	< 1				11.1
7.9				0.61	0.064	10	1.3	8				9.8
8.0				0.28	0.031	9	1.3	9				9.0
8.0				0.19			1.3	12				8.7
5A1a		EXTRACTABLE CATIONS					BASE SAT. %	Base Sat. %	Sum	Sum	Ca/Mg	MOISTURE AT SATU- RATION
6N2b		6O2b	6H1a	6P2a	6Q2a		NH <sub>4</sub> OAc EXCH.	on Sum Cations	Ext. Bases	Ext. Cat- ions		
CATION EXCHANGE CAPACITY NH <sub>4</sub> OAc		Co	Mg	H	Na	K						

Soil type: Monona silt loam

Soil No.: 859Iowa-43-2

Location: 948 feet east and 360 feet north of the southwest corner of the SW1/4 of the NE1/4 of Sec. 18, T80N, R42W, Harrison County, Iowa.

Slope: 25 percent convex, east exposure, upper part of slope.

Vegetation: Mature oak and young elm, mixed brush and bluegrass ground cover.

Geomorphic surface: Recent.

Collected by and date: G. E. Simonson, September 29, 1959.

Horizon and

Lincoln

Lab. Number

- |             |   |
|-------------|---|
| 02          | 1 to 0 inch. Partially decayed leaves and twigs; abrupt lower boundary.   |
| A1<br>12167 | 0 to 4 inches. Very dark brown (10YR 2/2) silt loam, dark gray (10YR 3.5/1) dry; sparse mixing of very dark grayish brown (10YR 3/2) evident when crushed; moderate fine granular; friable; structure appears to be predominantly casts of earthworms and other fauna; abundant fibrous roots; leached post-Farmdale loess; clear lower boundary. |
| B2<br>12168 | 4 to 10 inches. Mixed very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) silt loam, dark grayish brown (10YR 4/2) and brown (10YR 5/2) dry; weak fine subangular blocky; friable; abundant worm casts; matrix is leached but carbonate concretions are common; clear wavy lower boundary.                                       |
| B3<br>12169 | 10 to 15 inches. Brown (10YR 4.5/3) silt loam; common dark grayish brown (10YR 3/2) worm casts; weak medium subangular blocky; friable; calcareous; clear lower boundary.   |
| C1<br>12170 | 15 to 28 inches (sampled 18 to 28 inches). Brown (10YR 5/3) silt loam; very weak subangular blocky-massive; friable; calcareous; common worm casts; diffuse lower boundary.   |
| C2<br>12171 | 28 to 40 inches (sampled 34 to 40 inches). Brown (10YR 5/3) silt loam; sparse fine yellowish brown (10YR 5/6) mottles; massive; friable; sparse worm casts; calcareous post-Farmdale loess.   |

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1961

SOIL TYPE Monona LOCATION Harrison County, Iowa  
silt loam

SOIL NOS. 859Iowa-43-3 LAB. NOS. 12172-12178

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-4	A11	<0.1	<0.1	0.1	0.2	2.2	74.2	23.3	48.6	27.8	-	s11
4-8	A12	<0.1	<0.1	0.1	0.2	2.2	74.8	22.7	49.6	27.5	-	s11
8-14	B1	<0.1	<0.1	<0.1	0.3	2.3	74.6	22.8	46.9	30.2	-	s11
14-22	B2	<0.1	<0.1	<0.1	0.1	2.1	72.9	24.9	45.9	29.1	-	s11
24-34	B3	<0.1	<0.1	<0.1	0.2	2.0	74.3	23.5	46.5	29.9	-	s11
40-50	C1	<0.1	<0.1	0.1	0.3	2.5	73.6	23.5	44.3	32.0	-	s11
64-74	C2	<0.1	<0.1	0.1a	0.3b	2.6	77.2	19.8	52.1	27.9	-	s11
<hr/>												
pH		ORGANIC MATTER				Free Iron	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM	6E1a	MOISTURE TENSIONS			
8C1a	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	Fe <sub>2</sub> O <sub>3</sub> %		CaCO <sub>3</sub> equiv- alent	GYP SUM me./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	4B2 15 ATMOS.
1:1			%	%		6C1a		%		%	%	%
6.9			4.88	0.386	13	1.2		< 1				15.3
5.7			2.04	0.177	12	1.4						10.7
5.4			1.32	0.124	11	1.5						10.4
5.7			0.73	0.080	9	1.6						10.6
5.8			0.46	0.052	9	1.8						10.4
6.1			0.28			1.6						11.4
6.4			0.24			1.8						9.9
<hr/>												
5A1a	EXTRACTABLE CATIONS					5B1a	BASE SAT. % NH <sub>4</sub> OAc EXCH.	Base Sat. % on Sum Cations	Sum Ext. Bases	Sum Ext. Cat- ions	Ca/Mg	MOISTURE AT SATU- RATION
CATION EXCHANGE CAPACITY NH <sub>4</sub> OAc	6N2b Co	6O2b Mg	6H1a H	6P2a Na	6Q2a K							
	milliequivalents per 100g. soil					5C1	5C3	5B1a	5A3a	8D3		%
29.4	26.7	4.5	6.0	< 0.1	0.6	108	84	31.8	37.8	5.9		
20.9	14.2	3.5	8.4	< 0.1	0.5	87	68	18.2	26.6	4.0		
18.3	10.9	3.6	7.2	< 0.1	0.4	81	67	14.9	22.1	3.0		
17.7	11.1	4.6	5.8	0.1	0.4	92	74	16.2	22.0	2.4		
17.6	11.2	5.4	5.8	0.1	0.4	97	75	17.1	22.9	2.1		
19.3	12.5	6.4	3.9	0.1	0.4	100	83	19.4	23.3	2.0		
17.3	11.0	5.6	3.4	0.2	0.4	99	83	17.2	20.6	2.0		

a. Many Fe-Mn? concr.

b. Few Fe-Mn? concr.

Soil type: Monona silt loam  
 Soil No.: 859Iowa-43-3  
 Location: 468 feet east and 425 feet north of the southwest corner of the SW1/4 of the SE1/4 of Sec. 18, T80N, R42W, Harrison County, Iowa.  
 Slope: 3 to 4 percent convex.  
 Vegetation: Mature and young elm, sparse brush ground cover.  
 Geomorphic surface: Hatcher.  
 Collected by and date: G. H. Simonson, September 30, 1959.

Horizon and  
 Lincoln  
 Lab. Number

O2	1 to 0 inch. Partially decayed leaves and twigs.
A11 12172	0 to 4 inches. Black (10YR 2/1) silty loam, very dark gray (10YR 3.5/1) dry; weak very fine granular; very friable; appears to be mainly droppings of small fauna; abundant light gray silt grains apparent when dry; leached post-Farmdale loess; clear lower boundary.
A12 12173	4 to 8 inches. Very dark gray (10YR 3/1) silt loam, dark gray (10YR 4.5/1) dry; very dark grayish brown (10YR 3/2) crushed; weak fine subangular blocky with a definite tendency toward platiness in spots; friable; abundant droppings of small fauna including common worm casts; abundant light gray silt grains apparent when dry; clear lower boundary. (This horizon appears to have some characteristics of an incipient A2.)
B1 12174	8 to 14 inches. Mixed very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) silt loam, dark grayish brown (10YR 4/2) crushed; moderate fine subangular blocky; friable; light gray silt grains in patches prominent on ped surfaces when dry; common worm casts; gradual lower boundary.
B2 12175	14 to 22 inches. Dark brown (10YR 3/3) silt loam; dark brown (10YR 4/3) ped interiors; moderate fine subangular blocky; friable; sparse light gray silt grains on ped surfaces; sparse worm casts; gradual lower boundary.
B3 12176	22 to 36 inches (sampled 24 to 34 inches). Brown (10YR 4/4) silt loam; weak medium subangular blocky; friable; diffuse lower boundary.
C1 12177	36 to 60 inches (sampled 40 to 50 inches). Brown (10YR 4/3) silt loam; some patches of brown (10YR 5/3); weak medium subangular blocky to massive; friable; diffuse lower boundary.
C2	60 to 96 inches (sampled 64 to 74 inches). Brown (10YR 5/3 5/4) silt loam; some patches of brown (10YR 5/3); weak medium subangular blocky to massive; friable; diffuse lower boundary.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1961

SOIL TYPE Monona LOCATION Harrison County, Iowa  
silt loam, acid variant

SOIL NOS. 859Iowa-43-4 LAB. NOS. 12179-12185

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-3½	A11	<0.1	0.2a	0.1a	0.4	2.2	73.9	23.2	48.1	28.2	-	s11
3½-6	A12	0.1a	0.1a	0.1a	0.2	2.5	73.7	23.3	48.9	27.4	-	s11
6-12	B21	<0.1	<0.1	<0.1	0.2	2.6	71.8	25.4	47.0	27.5	-	s11
12-22	B22	<0.1	<0.1	<0.1	0.2	2.6	71.9	25.3	46.1	28.5	-	s11
25-35	B3	<0.1	0.1	0.1	0.2	2.6	74.3	22.7	50.8	26.2	-	s11
40-50	C1	<0.1	0.1	0.2	0.3	3.7	72.8	22.9	48.8	27.8	-	s11
60-70	C2	0.1b	0.1b	0.1b	0.4c	2.6c	80.7	16.0	50.8	32.7	-	s11
8C1a		pH	ORGANIC MATTER		Free Iron	ELECTRI- CAL CONDUCT- IVITY EC x 10³ MILLIMHOS PER CM	6E1a	MOISTURE TENSIONS				
		1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	Fe₂O₃%	CoCO₃ equiv- alent	GYPSUM me./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	4B2 15 ATMOS.

Soil type: Monona silt loam, acid variant

Soil No.: S59Iowa-43-4

Location: 360 feet east and 425 feet north of the southwest corner of the SW<sup>1</sup>/<sub>4</sub> of the SE<sup>1</sup>/<sub>4</sub> of Sec. 18, T80N, R42W, Harrison County, Iowa.

Slope: 11 percent convex, west exposure, upper part of slope.

Vegetation: Large and small elm with some hackberry.

Geomorphic surface: Late Wisconsin to Recent.

Collected by and date: G. H. Simonson, September 30, 1959.

Horizon and

Lincoln

Lab. Number

O2	1½ to 0 inches. Partially decayed leaves and twigs.
A11 12179	0 to 3½ inches. Very dark gray (10YR 3/1) silt loam; dark gray (10YR 4/1) dry; very fine weak granular; very friable; appears to be predominantly small fauna droppings other than earthworm casts; leached post-Farmdale loess; clear lower boundary.
A12 12180	3½ to 6 inches. Very dark grayish brown (10YR 3/2) silt loam; common mixing of very dark gray (10YR 3/1); dark grayish brown (10YR 4/2) dry; weak fine granular with slight tendency to platiness in spots; friable; sparse light gray silt grains apparent when dry; abundant small fauna droppings and common worm casts; clear lower boundary.
B21 12181	6 to 12 inches. Dark brown (10YR 3/3) silt loam; brown (10YR 3/4) ped interiors; moderate fine sub-angular blocky; friable; light gray silt grains in patches on peds prominent when dry; gradual lower boundary.
B22 12182	12 to 22 inches. Dark brown to brown (10YR 3/4) silt loam; brown (10YR 4/4) ped interiors; weak to moderate medium subangular blocky; friable; sparse worm casts; gradual lower boundary.
B3 12183	22 to 40 inches. Sampled 25 to 35 inches. Brown (10YR 3.5/4) silt loam; brown (10YR 4/4) crushed; very weak medium subangular blocky; friable; diffuse lower boundary.
C1 12184	40 to 52 inches. Brown (10YR 5/3) silt loam; sparse to common gray and yellow brown mottles; massive; friable; abrupt lower boundary.
C2 12185	52 to 70 inches. Sampled 60 to 70 inches. Brown (10YR 5/3) silt loam; common gray and yellow brown mottles; massive; friable; calcareous post-Farmdale loess.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1961

SOIL TYPE Monona LOCATION Harrison County, Iowa  
silt loam, acid variant

SOIL NOS. 859Iowa-43-5 LAB. NOS. 12186-12192

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-4	A11	<0.1	0.1a	0.1a	0.2	2.9	72.7	24.0	51.8	23.9	-	s11
4-8	A12	<0.1	0.1a	0.1a	0.3	3.7	71.0	24.8	51.9	23.0	-	s11
8-13	B1	<0.1	0.1a	0.1a	0.3	3.5	69.5	26.5	50.6	22.6	-	s11/sic1
13-21	B2	<0.1	0.1a	0.1a	0.4	3.5	69.5	26.4	49.6	23.6	-	s11
24-34	B3	0.1a	0.1a	0.1a	0.4	3.5	70.2	25.6	49.9	24.0	-	s11
34-48	C1	0.1a	0.1a	0.2a	0.5	3.0	72.6	23.5	51.1	24.8	-	s11
52-62	C2	0.1b	0.3b	0.2b	0.6c	3.3c	76.1	19.4	54.1	25.7	-	s11
pH		ORGANIC MATTER				Free Iron	ELECTRI- CAL CONDUCTI- VITY EC x 10 <sup>3</sup> MILLIMHOS PER CM @25°C.	6E1a	MOISTURE TENSIONS			
8C1a		1:5	1:10	6A1a	6B1a			CoCO <sub>3</sub> equiv- alent	GYPSUM mg./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	4B2
1:1				ORGANIC CARBON %	NITRO- GEN %	C/N	Fe <sub>2</sub> O <sub>3</sub> %					15 ATMOS. %
7.2				4.25	0.363	12	1.0	< 1				16.7
6.2				1.51	0.135	11	1.2					11.0
5.3				0.84	0.088	10	1.3					11.0
5.8				0.50	0.053	9	1.4					10.8
5.8				0.37	0.043	9	1.1					11.5
6.4				0.32			1.0					11.3
7.8				0.20			0.9	10				10.3
5A1a	EXTRACTABLE CATIONS					5B1a	BASE SAT. % NH <sub>4</sub> OAc EXCH.	Base Sat. % on Sum Cations	Sum Ext. Bases	Sum Ext. Cat- ions	Ca/Mg	MOISTURE AT SATU- RATION
6N2b	6O2b	6H1a	6P2a	6Q2a								
Co	Mg	H	Na	K								
milliequivalents per 100g. soil						5C1	5C3	5B1a	5A3a	8D3		%

Soil type: Monona silt loam, acid variant

Soil No.: 899 Iowa-43-5

Location: 115 feet east and 420 feet north of the southeast corner of the SW 1/4 of the SW 1/4 of Sec. 18, T14N, R10E, S1E

Slope: 15 percent convex, west exposure, near base of slope.

Vegetation: Large elm and hackberry, no understory.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson, September 30, 1959.

Horizon and

Lincoln

Lab. Number

O2	1½ to 0 inches. Partially decayed leaves and twigs.
A11 12186	0 to 4 inches. Black (10YR 2.5/1) silt loam; very dark gray (10YR 3.5/1) dry; fine granular; very friable; abundant worm casts and small fauna droppings; leached post-Farmdale loess; clear lower boundary.
A12 12187	4 to 8 inches. Very dark gray (10YR 3/1) silt loam; very dark grayish brown (10YR 3/2) crushed; dark gray (10YR 4.5/1) dry; moderate very fine subangular blocky breaking to fine granular; friable; common light gray silt particles apparent when dry; abundant worm and other small fauna casts; gradual lower boundary.
B1 12188	8 to 13 inches. Very dark grayish brown (10YR 3/2) silt loam; some mixing of very dark gray (10YR 3/1); moderate fine subangular blocky; friable; common patches of light gray silt grains prominent on ped surfaces when dry; abundant worm casts; gradual lower boundary.
B2 12189	13 to 22 inches. Brown (10YR 4/3) silt loam; brown (10YR 4/4) ped interiors; weak to moderate medium subangular blocky; friable; sparse light gray silt grains on nodes; abundant worm casts; gradual lower boundary.

B3  
12190 22 to 36 inches. Brown (10YR 4/4) silt loam; brown to yellowish brown (10YR 4.5/4) crushed; weak medium subangular blocky; friable; common worm casts; diffuse lower boundary. (Sampled 24 to 34 inches.)



[illegible]

Soil type: Monona silt loam

Soil No.: S59Iowa-43-6

Location: 465 feet north and 320 feet west of the southeast corner of the SW1/4 of the SW1/4 of Sec. 7, T80N, R42W, Harrison County, Iowa.

Slope: 5 percent west-southwest exposure.

Site: The profile is in a virgin area on a moderately convex interfluvial summit near the break in gradient to a steep valley slope.

Vegetation: Bluegrass and buckbrush.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, October 19, 1959.

Horizon and

Lincoln

Lab. Number

- A11  
12382 0 to 4 inches. Very dark brown (10YR 2.5/2) silt loam; very dark grayish brown (10YR 3/2) crushed; moderate fine granular; friable; abundant fine worm casts, mainly as individual pellets; abundant fine fibrous roots; noncalcareous post-Farmdale loess; gradual lower boundary.
- B1  
12383 4 to 8 inches. Mixed very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) silt loam; dark brown (10YR 3/3) crushed; weak to moderate fine subangular blocky; friable; abundant worm casts, both in strings and individual pellets; abundant roots; gradual lower boundary.
- B2  
12384 8 to 13 inches. Dark brown (10YR 3/3) silt loam; some mixing of very dark grayish brown (10YR 3/2); weak fine subangular blocky; friable; abundant distinct worm casts; common roots; gradual lower boundary.
- 
- B3  
12385 13 to 19 inches. Dark yellowish brown (10YR 3/4) silt loam; dark brown to brown (10YR 4/3) crushed; sparse mixing of very dark grayish brown and dark brown (10YR 3/2-3/3) worm casts; very weak medium subangular blocky breaking to very fine granular structure that appears to be mainly worm cast pellets; friable; abundant worm casts; common roots; clear lower boundary.
- C1  
12386 19 to 25 inches. Dark brown to brown (10YR 4/3) silt loam; brown (10YR 4.5/3) crushed; massive but breaks to very fine individual worm cast pellets; very friable; abundant worm casts; abrupt lower boundary.
- C2  
12387 25 to 48 inches (sampled 36 to 48 inches). Brown (10YR 4.5/3) silt loam; brown (10YR 5/3) crushed; massive; friable; common worm casts; sparse fine carbonate aggregates; calcareous post-Farmdale loess.

SOIL TYPE Monona  
silt loam LOCATION Harrison County, Iowa

PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)												
DEPTH INCHES	HORIZON	1B1a	3A1								2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	( $< 19\mu$ )	
0-6	A11	<0.1	<0.1	0.1	0.3	4.1	73.0	22.5	57.0	20.3	-	s11
6-11	A12	<0.1	<0.1	0.1	0.3	3.8	74.1	21.7	54.6	23.5	Tr.	s11
11-19	B1	<0.1	0.1a	0.1a	0.6a	3.7a	75.2	20.3	54.3	24.9	Tr.	s11
19-29	C1	<0.1	0.1b	0.2b	0.6a	3.5a	76.6	19.0	55.4	25.0	Tr.	s11
29-40	C2	<0.1	0.1b	0.1b	0.5a	3.3a	79.5	16.5	56.3	26.7	Tr.	s11
pH		ORGANIC MATTER				Free Iron	ELECTRICAL CONDUCTIVITY EC $\times 10^3$	6E1a	MOISTURE TENSIONS			
8C1a		6A1a	6B1a									4B2
		ORGANIC CARBON	NITROGEN			Fe $\times 10^3$		CaCO <sub>3</sub> equiv. %	GYPSUM mg./100g. soil	1/10 ATMOS	1/3 ATMOS	15 ATMOS

Soil type: Monona silt loam

Soil No.: 859Iowa-43-8

Location: 460 feet north and 632 feet west of the southeast corner of the SW1/4 of the SW1/4 of Sec. 7, T80N, R42W, Harrison County, Iowa.

Slope: 18 percent west exposure, slightly convex.

Site: Lower third of valley slope, just below the break in gradient to the "catstepped" steeper upper slope.

Vegetation: Tall native grasses, mainly big bluestem; profile site is on the boundary to an area of young timber just downslope.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, October 20, 1959.

#### Horizon and

#### Lincoln

#### Lab. Number

- |              |   |
|--------------|---|
| A11<br>12392 | 0 to 6 inches. Very dark grayish brown (10YR 3/2) silt loam, very dark grayish brown (10YR 3/2) crushed; weak fine subangular blocky breaking to moderate fine granular; friable; common worm casts; noncalcareous post-Farmdale loess; gradual lower boundary. |
| A12<br>12393 | 6 to 11 inches. Very dark grayish brown (10YR 3/2) silt loam, very dark grayish brown (10YR 3.5/2) crushed; weak fine subangular blocky breaking to granular; friable; common worm casts; abrupt wavy boundary.   |
| B1<br>12394  | 11 to 19 inches. Very dark to dark grayish brown (10YR 3.5/2) silt loam; common very dark grayish brown (10YR 3/2) worm casts; weak medium subangular blocky; very friable; abundant worm casts; calcareous; gradual lower boundary.                            |
| C1<br>12395  | 19 to 29 inches. Grayish brown to brown (10YR 5/2.5) silt loam; weak medium subangular blocky breaking to fine granular; very friable; abundant worm casts; calcareous; diffuse lower boundary.   |
| C2<br>12396  | 29 to 40 inches. Brown (10YR 5/3) silt loam; very weak medium subangular blocky grading to massive with depth; very friable; crumbles easily due to common worm cast pellets; calcareous post-Farmdale loess.   |

SOIL SURVEY LABORATORY Lincoln, Nebr. October, 1963

SOIL TYPE Miscatine LOCATION Benton County, Iowa  
silty clay loam

SOIL NOS. S60Iowa-6-1-(1-15) LAB. NOS. 14179-14193

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1A1a	2A1	3A1	4A1	5A1	6A1	7A1	8A1	9A1	10A1	
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY	2A2	3A2	4A2	
0-7	A1	-	0.4	0.3	0.4	1.2	67.6	30.1	32.8	36.2	-	
7-11	A12	0.1	0.3	0.3	0.4	1.1	63.1	34.7	30.2	34.2	-	
11-18	A3	-	0.3	0.3	0.4	1.1	62.7	35.2	30.6	33.4	-	
18-22	B1	0.1	0.5	0.3	0.4	1.1	62.8	34.8	30.8	33.3	-	
22-29	B21	0.1	0.5	0.2	0.4	1.4	61.9	35.5	32.5	31.0	-	
29-35	B22	0.2	0.6	0.3	0.4	1.9	63.1	33.5	35.9	29.3	-	
35-41	B23	0.1	0.3	0.2	0.4	2.8	64.2	32.0	39.8	27.4	-	
41-46	B3	-	0.1	0.2	0.4	2.5	66.9	29.9	40.1	29.5	-	
46-52	C1	-	-	0.1	0.2	2.5	70.9	26.3	45.5	28.0	-	
52-58	C2	-	0.1	0.1	0.5	3.7	70.3	25.3	46.8	27.5	-	
58-66	C3	-	0.1	0.2	0.5	4.0	70.4	24.8	46.1	28.6	-	
66-72	C4	-	-	0.1	0.4	3.3	71.6	24.6	44.7	30.4	-	
72-78	C5	0.3	1.0	1.3	2.4	3.7	69.5	21.8	48.6	25.7	-	
78-84	IID1	4.5	10.4	11.5	19.8	9.0	28.3	16.5	32.2	13.9	9	
84-98	IID2	2.2	6.2	8.5	29.8	17.2	23.8	12.3	47.2	10.2	2	
8C1a	6C1a	ORGANIC MATTER										
pH	Ext. Iron as Fe	6A1a		6B1a		Field Moist		30 Cm.		O.D.		Moist. Reten. 4B2
		ORGANIC CARBON	NITRO- GEN	C/N	4B4	4A1a	4B3	4A1c	4A1b	1/3 ATMOS. Pieces	15 ATMOS. Sieved	
6.0	0.9	3.20	0.250	13	24.6	1.38	29.0	1.35	1.50		14.4	
5.4	0.8	3.13	0.240	13							16.0	
5.4	0.9	2.44	0.201	12	31.8	1.25	34.2	1.24	1.36		16.0	
5.2	1.0	1.69	0.143	12	29.9	1.26	32.0	1.26	1.39		15.6	
5.3	1.0	1.16	0.107	11	28.0	1.31	29.4	1.31	1.46		15.7	
5.6	1.0	0.66			24.9	1.34	27.6	1.32	1.50		15.2	
6.5	1.0	0.41			22.8	1.38	26.8	1.36	1.53		14.8	
6.8	1.1	0.30			24.4	1.41	27.4	1.38	1.59		14.4	
7.1	1.0	0.20									12.5	
7.3	1.1	0.14			29.1	1.42	29.1	1.42	1.58		12.5	
7.6	1.0	0.12			30.8	1.42	29.4	1.42	1.54	23.6	12.7	
7.6	1.0	0.10									10.7	
7.5	1.0	0.12									7.1	
7.5	2.1	0.03									4.9	
7.5	0.5	0.02										
5A1a	EXTRACTABLE CATIONS 5B1a											
CATION EXCHANGE CAPACITY NH <sub>4</sub> OAc	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	5A3a Sum	Base Sat.		8B1 Ratio to Clay Ca/Mg	8D3 Carbonate as CaCO <sub>3</sub>	5B1a Clay	
							5C1 on NH <sub>4</sub> OAc	5C3 on Sum Cations				
							CEC %	%	CEC			
26.5	20.8	4.4	10.7	0.1	0.3	36.3	97	70	.88	4.7		
27.7	17.5	4.9	14.6	0.1	0.3	37.4	82	61	.80	3.6		
27.2	16.0	5.5	14.1	0.1	0.4	36.1	81	61	.77	2.9		
25.9	14.4	7.0	12.9	0.1	0.4	34.8	84	63	.74	2.0		
25.3	14.8	7.4	10.6	0.1	0.4	33.3	90	68	.71	2.0		

Soil type: Muscatine silty clay loam  
 Soil No.: 860Iowa-6-1-(1-15)  
 Location: 476 feet north and 90 feet east of SW corner of SE1/4 SW1/4 Sec. 7, T85N, R12W, Benton County, Iowa.  
 Vegetation: Small grain stubble. Parent material: Wisconsin loess.  
 Physiographic position: Upland on convex south-facing slope near the top of an east-west ridge.  
 Slope: About 1-1/2 percent. Drainage: Imperfectly drained.  
 Permeability: Moderate. Ground water: None within 98 inches.  
 Moisture: Moist.  
 Described by: R. I. Turner, October 13, 1960.

Horizon and  
 Lincoln Lab. No.

- A1 0 to 7 inches. Black (N 2/ to 10YR 2/1)<sup>1</sup> light silty clay loam; cloddy, breaking to moderate fine granular structure; slightly firm; gradual boundary.  
 14179
- A12 7 to 11 inches. Black (N 2/) light silty clay loam; weak fine subangular blocky structure breaking to moderate fine and very fine granules; friable; numerous earthworm casts; gradual boundary.  
 14180
- A3 11 to 18 inches. Black (10YR 2/1) to very dark gray (10YR 3/1) light silty clay loam; moderate fine and very fine subangular blocky and moderate fine granular structure; slightly firm; gradual boundary.  
 14181
- B1 18 to 22 inches. Very dark gray (10YR 3/1) medium silty clay loam; moderately fine and very fine subangular blocky structure; friable; few fine faint very dark grayish brown (10YR 3/2) mottles; common fine tubular inped pores; a few small dark oxide concretions; gradual boundary.  
 14182
- B21 22 to 29 inches. Very dark gray (10YR 3/1) to dark gray (10YR 4/1) medium silty clay loam; moderate fine and very fine subangular blocky structure; slightly firm; common fine faint dark grayish brown (10YR 4/2) mottles; common fine tubular inped pores; a few thin discontinuous clay films on vertical ped surfaces; common small dark hard oxide concretions; gradual boundary.  
 14183
- B22 29 to 35 inches. Dark grayish brown (2.5Y 4/2) medium silty clay loam; weak medium prismatic structure breaking to moderate fine subangular blocks; slightly firm; few fine faint dark gray (10YR 4/1), a few fine distinct yellowish brown (10YR 5/6), and common fine distinct olive brown (2.5Y 4/4) to light olive brown (2.5Y 5/4) mottles; common fine tubular inped pores; a few thin discontinuous clay films; common small dark hard oxide concretions; gradual boundary.  
 14184
- B23 35 to 41 inches. Dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/4) medium silty clay loam; weak medium prismatic structure breaking to weak medium subangular blocks; slightly firm; dark grayish brown (2.5Y 4/2) ped exteriors with a few fine distinct dark gray (10YR 4/1) mottles; grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/4) ped interiors with yellowish brown (10YR 5/6) mottles; common fine tubular inped pores; a few dark gray distinct clay films on peds and in root channels; common small dark hard oxide concretions; gradual boundary.  
 14185
- B3 41 to 46 inches. Grayish brown (2.5Y 5/2), light brownish gray (2.5Y 6/2), and yellowish brown (10YR 5/6)  
 14186

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1963

SOIL TYPE Muscatine LOCATION Grundy County, Iowa  
silty clay loam

SOIL NOS. 860Iowa-38-1-(1-11) LAB. NOS. 14168-14178

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2.1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (19mm)	
0-7	A1p	0.3	0.4	0.4	0.5	1.4	64.2	32.8	30.4	35.4	-	
7-14	A12	0.1	0.4	0.3	0.5	1.3	62.8	34.6	29.9	34.4	-	
14-18	A3	0.1	0.6	0.4	0.5	1.4	61.7	35.3	30.2	33.1	-	
18-23	B1	0.1	0.6	0.3	0.4	1.6	60.8	36.2	31.8	30.8	-	
23-30	B21	0.2	0.6	0.2	0.4	2.1	61.7	34.8	34.9	29.1	-	
30-35	B22	-	0.2	0.2	0.5	3.0	63.3	32.8	38.9	27.7	-	
35-41	B31	-	-	0.1	0.4	4.6	63.8	31.1	42.3	26.3	-	
41-47	B32	-	-	0.1	0.5	4.8	64.2	30.4	40.4	28.9	-	
47-53	B3C1	-	-	0.1	0.3	4.1	67.1	28.4	41.9	29.5	tr.	
53-60	C2	-	0.1	0.2	0.5	4.0	71.0	24.2	46.1	29.2	tr.	
60-70	C3	-	0.2	0.1	0.4	3.5	73.7	22.1	46.9	30.5	tr.	
8C1a	5C1a	ORGANIC MATTER					Bulk Density			Moist. Reten.		
pH	Ext.	6A1a	6B1a				Field Moist		30 Cn.	O.D.	1/3	4B2
	Iron	ORGANIC	NITRO-				4B4	4A1a	4B3	4A1c	4A1h	15
	as Fe	CARBON	GEN				% M.	g/cc	% M.	g/cc	g/cc	ATMOS.
	%	%	%									Sieved
6.1	0.9	3.46	0.270	13			25.5	1.35	31.5	1.30	1.48	15.5
5.7	0.9	2.44	0.196	12								15.0
5.6	1.0	1.72	0.142	12			29.6	1.28	30.8	1.28	1.41	14.6
5.6	1.0	1.04	0.100	10								15.6

Soil type: Muscatine silty clay loam

Soil No.: 860Iowa-38-1-(1-11)

Location: 130 feet south and 126 feet west of NE corner of NW1/4 SW1/4 NE1/4 Sec. 20, T87N, R17W, Grundy Co., Iowa.

Vegetation: Meadow.

Parent material: Wisconsin loess.

Physiographic position: Nearly level upland on a very slightly convex east-facing slope.

Slope: About 1 percent.

Drainage: Imperfectly drained.

Permeability: Moderate.

Ground water: None within 70 inches.

Moisture: Moist.

Described by: D. F. Slusher and R. L. Buckner, October 13, 1960.

Horizon and

Lincoln Lab. No.

A1p 0 to 7 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam; cloddy breaking to weak fine subangular blocky

A12 7 to 14 inches. Black (10YR 2/1) light silty clay loam; moderate fine granular structure; friable; gradual boundary.

A3 14 to 18 inches. Black (10YR 2/1) light silty clay loam; moderate very fine and fine subangular blocky structure; friable; few fine distinct very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2 to 2.5Y 4/2) worm casts and mixings; kneaded color very dark gray (10YR 3/1); gradual boundary.

B1 18 to 23 inches. Mixed very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2 to 2.5Y 4/2) medium silty clay loam; moderate fine and very fine subangular blocky structure; friable; kneaded color very dark grayish brown (10YR 3/2); common fine tubular pores in peds; gradual boundary.

B21 23 to 30 inches. Dark grayish brown (10YR 4/2 to 2.5Y 4/2) and olive brown (2.5Y 4/4) medium silty clay loam; moderate fine and very fine subangular blocky structure; friable; dark grayish brown (10YR 4/2 to 2.5Y 4/2) on ped surfaces, olive brown (2.5Y 4/4) inside peds; a few very dark gray (10YR 3/1) worm casts and mixings from rodents; kneaded color olive brown (2.5Y 4/4); common fine tubular pores in peds; a few fine iron-manganese concretions; a few distinct patchy clay films on vertical ped surfaces; gradual boundary.

B22 30 to 35 inches. Dark grayish brown (10YR 4/2 to 2.5Y 4/2) and olive brown (2.5Y 4/4) to light olive



SOIL SURVEY LABORATORY Lincoln, Nebr. October 1959

SOIL TYPE Napier LOCATION Harrison County, Iowa  
silt loam

SOIL NOS. 858Iowa-43-6 LAB. NOS. 9593-9599

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a									2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-7	A11	<0.1	<0.1	<0.1	<0.1	2.7a	74.2	23.1	53.4	23.5	-	sil
7-18	A12	<0.1	0.1b	<0.1	0.2a	3.0a	73.3	23.4	54.2	22.2	-	sil
18-29	B1	<0.1	<0.1	<0.1	0.2a	2.6a	72.7	24.5	51.8	23.7	-	sil
29-37	B2	<0.1	<0.1	<0.1	<0.1	2.7a	73.0	24.3	52.5	23.2	-	sil
37-53	B3	0.1b	<0.1	<0.1	0.1a	2.4a	73.6	23.8	52.3	23.8	-	sil
53-63	C1	0.1b	<0.1	<0.1	<0.1	2.6a	74.6	22.7	53.7	23.5	-	sil
63-73	C2	0.1b	0.1b	<0.1	0.2a	2.7a	75.5	21.4	54.1	24.2	-	sil
pH		ORGANIC MATTER				Free Iron Fe <sub>2</sub> O <sub>3</sub> %	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM	6E1a CoCO <sub>3</sub> equiv- alent	GYPSUM me./100g. SOIL	MOISTURE TENSIONS		
8C1a	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	6C1a				1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1			%	%				%		%	%	%
6.6			3.35	0.297	11.3	1.1		<				14.1
7.0			1.55	0.140	11.1	1.2		<				10.9
7.1			1.40	0.129	10.8	1.3		<				11.1
7.1			1.14			1.3		<				11.3
7.2			0.87			1.4		<				11.1
6.9			0.62			1.3		<				10.5
6.3			0.45			1.3						10.2
5A1a	EXTRACTABLE CATIONS					BASE SAT. NH <sub>4</sub> Ac EXCH.	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg	MOISTURE AT SATU- RATION	
	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K							
	milliequivalents per 100g. soil					5C1						
27.6	24.8	3.4	5.0	<0.1	0.6	104	85	28.8	33.8	7.3		
21.4	17.9	3.8	4.5	<0.1	0.5	104	83	22.2	26.7	4.7		
20.8	15.6	5.2	4.5	<0.1	0.5	102	82	21.3	25.8	3.0		
19.5	14.1	6.0	3.7	0.1	0.4	106	85	20.6	24.3	2.4		
19.1	13.5	5.7	3.7	0.1	0.4	103	84	19.7	23.4	2.4		
18.3	13.1	5.3	3.3	0.1	0.4	103	85	18.9	22.2	2.5		
17.9	12.5	4.4	3.3	0.1	0.4	97	84	17.4	20.7	2.8		

Soil type: Napier silt loam

Soil No.: 858Iowa-43-6

Location: 425 feet east and 635 feet north of the southwest corner of the SW1/4 of the NW1/4 of Sec. 18, T80N, R42W, Harrison County, Iowa.

Slope: 7 percent concave upward.

Vegetation: Timbered bluegrass pasture with approximately 50 percent of area covered by oak, walnut, and elm; some buckbrush and gooseberry bushes.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, August 6, 1958.

# Horizon and

## Lincoln

### Lab. Number

A11 9593	0 to 7 inches. Very dark gray to black (10YR 2.5/1) silt loam, dark gray (10YR 4/1) dry; moderate medium and fine granular; friable; abundant fine fibrous roots; leached Recent alluvium; gradual to the A12.
A12 9594	7 to 18 inches. Very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; very dark gray (10YR 3/1) crushed; moderate fine and medium granular; friable; roots abundant to 12 or 13 inches, common below; common worm casts; diffuse to the B1.
B1 9595	18 to 29 inches. Very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; very dark brown (10YR 2/2) crushed; moderate to weak medium subangular blocky breaking to medium granular; friable; thin continuous coatings on peds; common worm casts; gradual to the B2.
B2 9596	29 to 37 inches. Very dark brown (10YR 2/2) silt loam; sparse very dark grayish brown (10YR 3/2) ped surfaces; very dark grayish brown (10YR 3/2) crushed; moderate to weak medium subangular blocky; friable; thin continuous coatings on peds; sparse worm casts; gradual to the B3.
B3 9597	37 to 53 inches. Very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 3/3) crushed; weak medium subangular blocky; friable; indistinct coatings on ped surfaces; sparse worm casts; gradual to the C1.
C1 9598	53 to 63 inches. Dark brown (10YR 3.5/3) silt loam, brown to dark brown (10YR 4/3) crushed; weak coarse prismatic to massive; friable; clear to the C2.
C2 9599	63 to 73 inches. Dark yellowish brown to yellowish brown (10YR 4.5/4) silt loam; massive; friable; abrupt to the C3.
C3	73 inches plus. Yellowish brown (10YR 5/4) silt loam; abundant white CaCO <sub>3</sub> concretions; sparse browner mottles; friable; massive; calcareous alluvium.

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1959

SOIL TYPE Napier LOCATION Harrison County, Iowa  
silt loam

SOIL NOS. S58Iowa-43-9 LAB. NOS. 9611-9617

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2.1	COARSE SAND 1.0-5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-7	A11	<0.1	<0.1	<0.1	0.2a	2.6a	73.7	23.5	51.0	25.4	-	s11
7-15	A12	<0.1	<0.1	<0.1	0.2a	3.4a	72.7	23.7	51.4	24.8	-	s11
15-23	B21	<0.1	<0.1	<0.1	0.2a	3.2a	71.4	25.2	50.2	24.5	-	s11
23-36	B22	<0.1	<0.1	<0.1	0.1a	2.9a	70.9	26.1	49.1	24.8	-	s11
36-50	B3	<0.1	0.1b	0.1b	0.2a	3.9a	70.4	25.3	51.3	23.1	-	s11
55-65	C1	0.1b	0.1b	0.1b	0.2a	3.9a	71.6	24.0	52.0	23.6	-	s11
77-89	C2	<0.1	0.1b	0.1b	0.2a	4.3a	71.2	24.1	51.8	23.8	-	s11
pH		ORGANIC MATTER				Free Iron Fe <sub>2</sub> O <sub>3</sub> %	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM	CoCO <sub>3</sub> equiv- alent	GYPSUM me./100g. SOIL	MOISTURE TENSIONS		4B2
8C1a	1:5	1:10	ORGANIC CARBON	NITRO- GEN	C/N	6C1a		%		1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1			%	%						%	%	%
6.2			4.41	0.376	11.7	1.0						16.5
6.1			2.08	0.169	12.3	1.3						12.1
6.2			1.09	0.100	10.9	1.3						11.2
5.3			1.03	0.098	10.5	1.3						11.6
5.8			0.86			1.2						11.2
6.0			0.73			1.2						10.9
5.8			0.60			1.5						10.8
5A1a	EXTRACTABLE CATIONS					5B1a	BASE SAT. % NH <sub>4</sub> Ac EXCH.	5C3 Base Sat. % on Sum Cations	5B1a Sum Bases	5A3a Sum Cations	8D3 Ca/Mg	MOISTURE AT SATU- RATION %
CATION EXCHANGE CAPACITY NR <sub>1</sub> Ac	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	5C1 milliequivalents per 100g. soil						

Soil type: Napier silt loam

Soil No.: 858Iowa-43-9

Location: 200 feet east and 475 feet south of the northwest corner of the SW1/4 of the SE1/4 of Sec. 18, T80N, R42W, Harrison County, Iowa.

Slope: 9 percent concave upward; western exposure.

Vegetation: Dominantly elm with a few walnut and basswood; understory of young trees; sparse weed and grass ground cover.

Geomorphic surface: Recent.

Collected by and date: G. H. Simonson and R. B. Daniels, August 8, 1958.

# Horizon and

## Lincoln

### Lab. Number

O2	1 to 0 inch. Decomposed and partially decomposed tree leaves and twigs; abundant fine fibrous roots; abrupt to the A11.
A11 9611	0 to 7 inches. Black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular; friable; abundant fine fibrous grass and tree roots; leached Recent alluvium; gradual to the A12.
A12 9612	7 to 15 inches. Black (10YR 2/1) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky breaking to fine granular; friable; abundant roots; gradual to the B21.
B21 9613	15 to 23 inches. Black to very dark gray (10YR 2.5/1) silt loam, grayish brown (10YR 5/2) dry; very dark brown to very dark grayish brown (10YR 2.5/2) crushed; moderate fine subangular blocky; friable; thin continuous coatings on peds; abundant worm casts; abundant tree roots; gradual to the B22.
B22 9614	23 to 36 inches. Very dark brown to very dark grayish brown (10YR 2.5/2) silt loam, very dark grayish brown (10YR 3/2) crushed; moderate medium subangular blocky; friable; thin continuous coatings on peds; sparse to common tree roots; gradual to the B3.
B3 9615	36 to 50 inches. Very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 3/3) crushed; weak medium and coarse subangular blocky; friable; diffuse to the C1.
C1 9616	50 to 70 inches (sampled 55 to 65 inches). Very dark grayish brown (10YR 3/2) silt loam; dark grayish brown to very dark grayish brown (10YR 3.5/2) crushed; massive; friable; leached; diffuse to the C2.
C2 9617	70 to 89 inches (sampled 77 to 89 inches). Dark grayish brown (10YR 4/2) silt loam; massive; friable; leached alluvium.

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Olmitz LOCATION Adair County, Iowa  
silty clay loam

SOIL NOS. S56Iowa-1-3 LAB. NOS. 5722-5731

1971

PARTICLE SIZE DISTRIBUTION (ASTM D 2484)

Soil type: Olmitz silty clay loam

Soil No.: 856Iowa-1-3

Location: Greenfield Quadrangle; 468 feet east of southwest corner of southwest quarter of northeast quarter of northwest quarter of Section 18, T76N, R31W, Adair County, Iowa.

Slope: 9 percent, concave.

Vegetation: Cultivated field.

Collected by and date: R. B. Daniels, F. J. Carlisle, and G. H. Simonson, July 25, 1956.

Horizon and  
Beltsville  
Lab. Number

Alp 5722	0 to 6 inches. Black (10YR 2/1) friable to very friable gritty light silty clay loam to heavy silt loam; weak medium granular structure; black to very dark gray (10YR 2.5/1) crushed and dark gray to dark gray brown dry; clear boundary to A12.
A12 5723 and 5724	6 to 22 inches. Sampled 6 to 14 and 14 to 22 inches. Black (10YR 2/1) friable gritty light silty clay loam; weak to moderate fine subangular blocky structure; black to very dark gray changing to very dark gray (10YR 2.5/1 changing to 3/1) with depth; dark gray to dark gray brown (10YR 4/1.5) dry; gradual boundary to AB.
AB 5725	22 to 29 inches. Very dark brown (10YR 2/2) friable gritty light silty clay loam with more sand than A12; some mixing of black (10YR 2/1) by biological activity; weak fine subangular blocky structure with tendency for peds to be arranged in very weak fine and medium prisms; very dark gray brown (10YR 3/2) crushed and very dark gray brown to dark gray brown (10YR 3.5/2) dry; gradual boundary to B21.
B21 5726	29 to 36 inches. Very dark brown to very dark gray brown (10YR 2.5/2) friable gritty medium silty clay loam; occasional areas of black (10YR 2/1) along channels; weak fine subangular blocky structure with thin discontinuous clay skins; the peds have a tendency to be arranged in very weak medium prisms; very dark gray brown (10YR 3/2) crushed and dark gray brown (10YR 4/2) dry; gradual boundary to B22.
B22 5727	36 to 46 inches. Very dark gray brown (10YR 3/2) friable medium clay loam with an increase in coarse sand over the B21 and occasional gravel is present; weak fine subangular blocky structure with thin clay skins which may be continuous, but identification as such is doubtful; peds are arranged in weak medium prisms; very dark gray brown (10YR 3/2) crushed and dark gray brown (10YR 4/2) dry; clear boundary to B23.
B23 (stone line) 5728	46 to 51 inches. Very dark gray brown (10YR 3/2 to 3.5/2) firm medium clay loam; weak fine and medium subangular blocky structure with thin continuous clay skins; the depth to the upper boundary of the stone line ranges from 45 to 47 inches across the face of the cut; stones range in diameter from 2 mm. to 10 inches; clear boundary to IIB24.
IIB24 5729	51 to 62 inches. Dark yellowish brown (1Y 4/4) firm medium to heavy clay loam; the soil material requires more pressure to crush than horizon above; weak medium blocky structure with thin continuous clay skins on vertical surfaces and discontinuous on horizontal surfaces; clay skins are dark gray brown to dark brown (10YR 4/2.5); some mixing of very dark gray brown (10YR 3/2); gradual boundary to IIC1.
IIC1 5730	62 to 81 inches. Sampled 63 to 75 inches. Dark brown (1Y 4/3) massive firm medium clay loam with occasional gravel; common fine distinct gray (5Y 6/1) and few fine dark yellowish brown to dark brown.

# SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Olmitz LOCATION Adair County, Iowa  
silty clay loam

SOIL NOS. 856Iowa-1-4 LAB. NOS. 5732-5738

PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)													3A1
DEPTH INCHES	HORIZON	1B1b										2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY	0.2-0.02	0.02-0.002	> 2 ( $< 7$ mm)		
		2.1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05							
0-7	A <sub>1p</sub>	0.9	2.4	3.7	6.2	3.9	53.9	29.0	36.1	24.9	< 1	sil	
7-17	A <sub>12</sub>	0.9	2.2	3.2	5.4	4.1	54.0	30.2	34.5	26.5	< 1	sic1	
17-27	AB	1.0	3.0	4.3	7.3	4.6	50.2	29.6	36.0	22.8	< 1	sic1/cl	
27-43	B <sub>21</sub>	2.8	3.6	5.0	9.5	6.3	43.9	28.9	35.3	20.1	< 1	cl	
43-54	B <sub>22</sub>	3.4	5.0	6.3	11.9	7.8	38.0	27.6	34.6	17.8	3	cl/1	
54-59	B <sub>3</sub>	6.9	9.0	9.5	14.3	8.6	25.1	26.6	30.0	11.2	25	scl	
59-78	D <sub>1</sub>	1.6	5.1	7.0	13.9	12.7	35.1	24.6	40.2	15.8	< 1	1	
pH		ORGANIC MATTER					EST% SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC-10 <sup>3</sup> MILLIMHOS PER CM 25°C.	GELs CaCO <sub>3</sub> equiv- alent	MOISTURE TENSIONS			
8C1a		6A1a	6B1a			GYPSUM mo./100g. SOIL				1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.	
1:1	1:5	1:10	ORGANIC CARBON %	NITRO- GEN %	C/N	%				%	%	%	
6.2			2.47	0.222	11.1								
5.8			2.14	0.200	10.7								
6.0			1.60	0.152	10.5								
6.5			0.71	0.075	9.5								
6.6			0.37	0.047	7.9								
7.0			0.23					< 1					
7.2			0.12					< 1					
5A3a	EXTRACTABLE CATIONS 5B1a					BASE SAT. %	SATURATION EXTRACT SOLUBLE				MOISTURE AT SATU- RATION %		
CATION EXCHANGE CAPACITY	6N2d	6O2b	6H1a	6P2a	6Q2a								
Sum	Ca	Mg	H	Na	K		Na	K					
← milliequivalents per 100g. soil →						503	← milliequivalents per liter →						
29.5	17.5	3.2	8.3	0.1	0.4	72							
27.6	15.4	3.2	8.5	0.1	0.4	69							
25.4	15.9	2.9	6.1	0.1	0.4	76							
22.4	15.8	3.0	3.2	0.1	0.3	86							
22.4	15.2	3.2	3.6	0.1	0.3	84							
21.5	14.7	2.8	3.6	0.1	0.3	83							
17.2	12.8	2.6	1.5	< 0.1	0.3	91							

Soil type: Olmitz silty clay loam

Soil No.: S56Iowa-1-4

Location: Greenfield Quadrangle; 210 feet east and 400 feet south of the northwest corner of northwest quarter of northwest quarter of southeast quarter of Section 18, T/6N, R31W, Adair County, Iowa.

Slope: 7 percent, flat to slightly concave.

Vegetation: Cultivated field.

Collected by and date: R. R. Daniels and G. H. Simonson. July 30. 1956.

Horizon and

Beltsville

Lab. Number

Alp

5732

0 to 7 inches. Black (10YR 2/1) friable heavy silt loam to light silty clay loam; cloddy structure which breaks to dark fine granular; black to very dark brown (10YR 2/1-3) crumbled and dark gray (10YR



		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										3A1				2A2		TEXTURAL CLASS	
DEPTH INCHES	HORIZON	1B1b																	
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY											
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002									
0-7	Alp	-	0.2	0.2	0.2	0.7	68.9	29.8	32.6	37.1	-	-	-	-	-	-	-		
7-12	Al2	-	0.2	0.1	0.2	0.4	65.9	33.3	30.9	35.5	-	-	-	-	-	-	-		
12-17	A3	-	Tr.	0.1	0.2	0.6	64.2	34.9	30.8	34.1	-	-	-	-	-	-	-		
17-21	B21	-	0.1	0.1	0.2	0.5	63.0	36.1	29.2	34.4	-	-	-	-	-	-	-		
21-26	B22	-	0.1	0.1	0.2	0.5	61.7	37.4	29.2	33.1	-	-	-	-	-	-	-		
26-32	B23	0.2	0.3	0.2	0.2	0.9	62.0	36.2	30.4	32.6	-	-	-	-	-	-	-		
32-40	B24	-	0.1	0.1	0.2	0.6	65.0	34.0	31.7	34.0	-	-	-	-	-	-	-		
40-46	B31	0.1	0.2	0.2	0.2	0.7	67.1	31.5	31.9	36.0	-	-	-	-	-	-	-		
46-53	B32	-	-	Tr.	0.1	0.5	69.9	29.5	34.7	35.8	-	-	-	-	-	-	-		
53-61	B33	-	-	Tr.	Tr.	0.2	69.7	29.6	34.7	35.7	-	-	-	-	-	-	-		
61-73	C1	-	-	Tr.	Tr.	0.8	71.1	28.1	35.8	36.1	-	-	-	-	-	-	-		
73-89	C2	-	-	0.1	Tr.	1.0	74.3	24.6	38.1	37.2	-	-	-	-	-	-	-		
8C1a		Organic Matter					Bulk Density					Moisture Retention							
	CaCO <sub>3</sub>	6A1a	6B1a								4B1b	4C1	4B2						
pH	Equiv-	O.C.	N	C/N	Field Moist		30 Cm.	A.D.			1/3 Bar	15-to	15-Bar						
1:1	alent	%	%		4B4	4A1a	4B3	4A1c	4A1b	Pieces	3-Bar	Sieved							
	%				% M.	g/cc	% M.	g/cc	g/cc	%	in/in	%							
6.0		2.44	0.207	12	23.0	1.53	28.2	1.46	1.64	25.7	.18	13.0							
5.1		2.08	0.195	11								14.0							
5.1		1.66	0.141	12	25.3	1.35	30.0	1.30	1.45	29.1	.19	14.4							
5.0		1.34	0.124	11								15.1							
5.0		1.02	0.094	11	25.1	1.35	28.7	1.31	1.52	28.8	.18	14.7							
5.2		0.56										16.2							
5.2		0.39										15.8							
5.2		0.22			21.6	1.43	29.0	1.34	1.55	28.7	.19	14.8							
5.8		0.16										14.1							
6.3		0.12			26.4	1.44	29.5	1.38	1.59	29.1	.21	14.1							
6.8	-	0.11										13.5							
7.2	-	0.06										11.6							
5A1a		EXTRACTABLE CATIONS					5B1a	Base Sat.		8D1	8D3	6C1a	6G1a						
	6N2b	6O2b	6H1a	6P2a	6Q2a	5A3a	5C1	5C3	Ratio			Ext.	A1						
	Ca	Mg	H	Na	K	Sum	on	on Sum	to Clay	Ca/Mg		Iron	KCl-						
							NH <sub>4</sub> OAc	NH <sub>4</sub> OAc	NH <sub>4</sub> OAc			as Fe	Ext.						
	milliequivalents per 100g. soil						CEC %	%	CEC			%	me/100g						
22.0	15.9	4.6	8.2	Tr.	0.4	29.1	95	72	.74	3.4	1.0	Tr.							
21.7	12.4				0.4	29.5	82	60	.65	2.5	0.9	Tr.							
22.6	12.1	5.0	11.7	Tr.	0.5	29.8	81	61	.65	2.2	1.0	0.1							
24.0	12.4	6.7	10.6	0.1	0.5	30.3	82	65	.66	1.8	1.1	0.1							
25.1	13.2	7.7	10.1	0.1	0.5	31.6	86	68	.67	1.7	1.1	0.3							
26.3	13.6	7.9	8.7	0.1	0.6	30.9	84	72	.73	1.7	1.3	0.3							
24.3	13.7	8.2	7.8	0.1	0.5	30.3	92	74	.71	1.7	1.3	0.1							
24.0	13.7	8.2	6.3	0.1	0.5	28.8	94	78	.76	1.7	1.3	Tr.							
22.1	13.1	7.0	4.2	0.1	0.5	24.9	94	83	.75	1.9	1.1	Tr.							
21.5	13.4	7.6	4.2	0.1	0.5	25.8	100	84	.73	1.8	1.1								
21.8	13.5	8.0	3.2	0.2	0.5	25.4	102	87	.78	1.7	1.2								
19.4	12.3	7.8	1.6	0.1	0.4	22.2	106	93	.79	1.6	0.6								

a. 20 Kg/M<sup>2</sup> to 60 inches.

Soil type: Otley silty clay loam

Soil No.: S61Iowa-54-2

Location: 154 feet east and 481 feet south of NW corner of SW1/4 NE1/4 Section 34, T77N, R10W, Keokuk County, Iowa.

Vegetation: Clover field.

Parent material: Wisconsin loess.

Physiographic position: Upland ridge on top of an interfluvium with slope nearly straight to slightly concave toward the south; near crest.

Slope: About 1.5 percent.

Drainage: Moderately well to well drained.

Permeability: Moderately slow.

Ground water: No water table at 121 inches.

Moisture: Slightly moist.

Described by: R. I. Dideriksen, A. R. Hildebaugh, and  
R. C. Russell, October 2, 1961.

# Horizon and

## Lincoln Lab. No.

- A1p 0 to 7 inches. Black (10YR 2/1)<sup>1</sup> to very dark brown (10YR 2/2) light silty clay loam, 10YR 5/1 dry, 10YR 2/2  
16284 kneaded; medium subangular blocky breaking to weak fine granular structure; slightly firm<sup>2</sup>; abundant worm-  
holes and casts; abrupt smooth boundary.
- A12 7 to 12 inches. Black (10YR 2/1) to very dark brown (10YR 2/2) light silty clay loam, 10YR 5/1 to 5/2 dry,  
16285 10YR 2/2 kneaded; weak fine subangular blocky breaking to moderate fine granular structure; friable; few peds  
of very dark grayish brown (10YR 3/2) mixed in horizon; abundant wormholes and few casts; weak fine platy  
structure at 7 to 8 inches; gradual smooth boundary.
- A3 12 to 17 inches. Mixed very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) silty clay loam,  
16286 10YR 5/2 and 5/1 dry, 10YR 3/2 kneaded; weak very fine subangular blocky breaking to moderate fine granular  
structure; friable; majority of peds very dark brown (10YR 2/2); abundant fine and very fine imbed tubular  
pores; few very dark gray (10YR 3/1) worm casts; common wormholes; clear smooth boundary.
- B21 17 to 21 inches. Mixed dark brown to brown (10YR 4/3) and very dark grayish brown (10YR 3/2) silty clay loam,  
16287 10YR 6/2 and 6/3 dry, 10YR 4/3 kneaded; moderate very fine subangular blocky structure; friable to slightly  
firm; very few very fine faint dark grayish brown (2.5Y 4/2) mottles; majority of peds 10YR 4/3; abundant  
fine and very fine imbed tubular pores; few fine soft oxide concretions; common wormholes and few very dark  
gray (10YR 3/1) casts; gradual smooth boundary.
- B22 21 to 26 inches. Same as above horizon.  
16288
- B23 26 to 32 inches. Dark brown (10YR 4/3) to yellowish brown (10YR 5/4) silty clay loam, 10YR 5/3 kneaded;  
16289 moderate very fine and fine subangular blocky structure; slightly firm; peds 10YR 4/3 exterior, 10YR 5/4,  
interior; few fine distinct dark reddish brown (5YR 3/3) and very few fine faint dark grayish brown (2.5Y  
4/2) mottles; abundant very fine and fine imbed tubular pores; thin continuous clay films on all peds; few  
fine soft oxide concretions; common wormholes, very few casts; gradual smooth boundary.
- B24 32 to 40 inches. Brown (10YR 5/3) to grayish brown (2.5Y 5/2) silty clay loam, 10YR 5/4 kneaded; weak medium  
16290 prismatic breaking to moderate medium and fine subangular blocky structure; slightly firm to firm; peds  
10YR 5/3 exterior, 2.5Y 5/2 interior; some dark grayish brown (10YR 4/2) stains on peds in places; few medium  
distinct dark brown (10YR 3/3) and few fine prominent dark reddish brown (5YR 3/3) mottles; abundant fine and  
very fine imbed tubular pores; few thin discontinuous clay films on peds; few fine soft oxide concretions;  
very few wormholes; gradual smooth boundary.
- B31 40 to 46 inches. Dark grayish brown to grayish brown (2.5Y 4/2 to 5/2) light silty clay loam; weak medium  
16291 prismatic breaking to strong medium angular blocky structure; slightly firm; few common 10YR 5/4 mottles;  
common distinct 7.5YR 5/6 segregations; abundant fine and very fine imbed tubular pores; common fine hard  
oxide concretions; horizon distinctly grayer than above; gradual smooth boundary.
- B32 46 to 53 inches. Grayish brown (2.5Y 5/2) light silty clay loam; weak coarse prismatic breaking to coarse  
16292 and medium angular blocky structure; slightly firm; some faint mottles of light brown and yellow.

SOIL SURVEY LABORATORY Lincoln, Nebr. Sept., 1963

SOIL TYPE Otley LOCATION Washington County, Iowa  
silty clay loam

SOIL NOS. S61Iowa-92-1 LAB. NOS. 16296-16307

187h PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 2A1

Soil type: Otley silty clay loam

Soil No.: S61Iowa-92-1

Location: 757 feet east and 226 feet south of NW corner of NW1/4 NW1/4 Section 27, T76N, R3W, Washington Co., Iowa.

Vegetation: Clover field.

Parent material: Wisconsin loess.

Physiographic position: Upland ridge on top of an interfluvium with slope slightly convex toward the southeast.

Slope: About 2 percent.

Drainage: Moderately well to well drained.

Permeability: Moderately slow.

Ground water: No water table at 124 inches.

Moisture: Slightly moist.

Described by: D. F. Slusher, October 3, 1961.

Horizon and

Lincoln Lab. No.

- A1p 0 to 6 inches. Black (10YR 2/1)<sup>1</sup> to very dark brown (10YR 2/2) light silty clay loam, 10YR 4/1 dry; 10YR 2/2 kneaded; moderate medium angular blocky structure; firm<sup>2</sup>; abrupt smooth boundary.
- A12 6 to 11 inches. Very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2) light silty clay loam, 10YR 5/2 dry; moderate fine granular structure; friable; ped exteriors 10YR 2/2; ped interiors 10YR 3/2; some mixing of 10YR 2/1 peds from Ap; few 10YR 3/2 worm casts and wormholes; clear smooth boundary.
- A3 11 to 15 inches. Very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2) light silty clay loam, 10YR 5/3 dry, 10YR 3/2 kneaded; moderate very fine subangular blocky and moderate fine granular structure; friable; ped exteriors 10YR 2/2; ped interiors 10YR 3/2; common 10YR 4/3 worm casts and a few 10YR 2/1 worm casts; common wormholes; clear smooth boundary.
- B1 15 to 20 inches. Dark brown to brown (10YR 4/3) medium silty clay loam, 10YR 6/2 dry; moderate very fine subangular blocky and moderate fine granular structure; friable; half unit higher in value and chroma kneaded; few streaks of 10YR 2/2 stains on peds; few fine impeded tubular pores; few fine hard oxide concretions; few fine 10YR 2/2 worm casts, few wormholes; gradual smooth boundary.
- B21 20 to 26 inches. Dark brown to brown (10YR 4/3) and dark grayish brown (10YR 4/2) medium silty clay loam, 10YR 5/3 kneaded; moderate fine subangular blocky breaking to moderate very fine subangular blocky structure; firm; ped exteriors 10YR 4/2; ped interiors 10YR 4/3; few 10YR 3/2 stains on peds; few very fine faint 10YR 5/2 and very few fine distinct 10YR 5/6 mottles; common fine and very fine impeded tubular pores; few distinct thin discontinuous clay films on ped faces; few fine soft oxide concretions; gradual smooth boundary.
- B22 26 to 32 inches. Dark grayish brown (10YR 4/2) and brown (10YR 5/3) medium silty clay loam, 10YR 4/3 to 5/4 kneaded; weak fine prismatic breaking to moderate fine subangular blocky structure; firm; ped exteriors 10YR 4/2 with 10YR 5/2 prism faces; ped interiors 10YR 5/3; common fine faint 10YR 5/2, 10YR 5/4, and 10YR 4/3 mottles inside peds; common fine and very fine impeded tubular pores; few distinct thin discontinuous clay films on ped faces; common fine hard oxide concretions and few oxide stains; gradual smooth boundary.
- B23 32 to 38 inches. Grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) medium silty clay loam, 10YR 5/4 kneaded; moderate medium prismatic breaking to moderate fine subangular blocky structure; firm; ped exteriors 2.5Y 5/2; interiors 2.5Y 5/2 and 10YR 5/4; extensive mottle-free but interiors have common fine distinct 10YR

# SOIL SURVEY LABORATORY Lincoln, Nebr.

December 1959

SOIL TYPE \*Pringhar LOCATION Clay County, Iowa  
silty clay loam

SOIL NOS. S59Iowa-21-4-(1-10) LAB. NOS. 11143-11152

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										TEXTURAL CLASS
		1B1a									2A2	
		VERY COARSE SAND 2.1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 ( $\leq 19\mu$ )	
0-7	A1p	0.1a	0.3b	0.3c	0.4c	1.3c	58.9	38.7	31.7	28.7	-	sic1
7-11	A12	0.1a	0.4b	0.3c	0.4c	1.1c	59.2	38.5	30.0	30.5	Tr.	sic1
11-16	A3	0.2a	0.4b	0.2b	0.4c	1.3c	58.9	38.6	29.0	31.4	-	sic1
16-21	B21	0.8a	0.5b	0.2b	0.2c	1.1c	61.2	36.0	32.2	30.2	-	sic1
21-30	B22	0.1	0.2b	0.1b	0.2c	2.1c	65.4	32.0	37.8	29.8	-	sic1
30-35	B3	0.1d	0.2e	0.3e	0.7e	3.5d	69.4	25.8	43.2	30.1	Tr.	sil
35-42	C	0.5d	0.7e	0.7e	1.3e	3.0d	68.4	25.4	41.1	31.0	Tr.	sil
42-47	C2	1.2f	2.1f	2.3d	4.1d	3.9d	60.9	25.5	38.7	28.2	Tr.	sil
47-60	IIC3	3.9f	5.2f	4.8f	8.6f	6.4f	40.7	30.4	26.7	24.8	3	cl
60-84+	IIC4	2.6f	4.2f	4.1f	8.1f	7.4f	42.1	31.5	28.1	25.8	Tr.	cl
pH		ORGANIC MATTER					Bulk Density			Water Content		
8C1a			6A1a	6B1a		Free	4A1a	4A1c	4A1h	4B4	4B3	4B2
1:1	1:5	1:10	ORGANIC CARBON	NITRO- GEN	C/N	Iron Fe <sub>2</sub> O <sub>3</sub>	Field- Moist	30-Cm.	O.D.	Field- Moist	30-Cm.	15-Bar
			%	%		%	g/cc	g/cc	g/cc	%	%	
5.6			3.87	0.313	12.4	1.0						17.1
5.7			3.80	0.312	12.2	1.1	1.18	1.15	1.36	27	33	17.2

Soil type: \*Primghar silty clay loam

Soil No.: S59Iowa-21-4-(1-10)

Location: 360 feet south of road center and 120 feet west of northwest corner of NE1/4 of NE1/4 of Sec. 14, T95N, R38W, Clay County, Iowa.

Vegetation and use: Corn; cropland.

Slope and land form: The site is on a broad very slightly convex rise in the loess-mantled Tazewell till plain. It is a few feet higher and southwest of the site of S59Iowa-21-3. Slope gradient is less than 1 percent.

Drainage: Imperfect.

Parent material: About 4 feet of loess overlying pebbly clay loam Tazewell till.

Collected by: R. H. Jordan and R. L. Juve.

Described by: F. J. Carlisle and R. I. Turner, June 9, 1959.

Horizon and  
Lincoln  
Lab. Number

- |              |   |
|--------------|---|
| Alp<br>11143 | 0 to 7 inches. Black (10YR 2/1, 3/1 dry) light silty clay loam, estimated 30 percent clay; moderate fine granular; friable; slightly browner color (about 2/1.2) when rubbed; numerous clear (uncoated) coarse silt and some fine sand grains; clear boundary.  |
| A12<br>11144 | 7 to 11 inches. Black (10YR 2/1, 3/1 dry) medium silty clay loam, estimated 32 percent clay; weak to moderate fine granular; friable; slightly browner color when rubbed; numerous clear (uncoated) coarse silt and some fine sand grains; gradual boundary.  |
| A3<br>11145  | 11 to 16 inches. Black (10YR 2/1.3) medium silty clay loam; mixed moderate fine granular and fine sub-angular blocky; friable; rubbed color is very dark brown (10YR 2/1.7); dry color is 10YR 3/1 with 2- to 3-mm. spots of yellowish brown; the horizon contains several nearly horizontal krotovinas about 1 inch in diameter filled with yellowish brown silty clay loam; common fine tubular pores; gradual boundary.  |
| B21<br>11146 | 16 to 21 inches. Dark grayish brown (1Y 3.5/2) and very dark gray (10YR 3/1) in fine pattern and about equal proportions, medium silty clay loam; moderate fine and very fine subangular blocky; friable; few fine spherical dark oxide concretions; mottling appears due to physical mixing of materials for the most part but some peds have 3/1 surfaces over 3.5/2 interiors; patches of smooth shiny surfaces on peds and in common fine tubular pores; clear wavy boundary.   |
| B22<br>11147 | 21 to 30 inches. Olive brown (1.5Y 4/3) medium silty clay loam; weak fine subangular blocky; friable; many fine tubular pores; patches of smooth shiny surfaces on most peds; common dark hard spherical oxide concretions; the horizon is noncalcareous but in the lower inch or two are a few white carbonate concretions less than 5 mm. across; fingers of dark gray (10YR 3.5/1) 2 to 4 mm. across extend into the upper part of this horizon from the horizon above (have the appearance of old root channels or worm burrows); clear boundary.   |
| B3<br>11148  | 30 to 35 inches. Light olive brown (2.5Y 5/3) light silty clay loam; weak fine subangular blocky with some weak prisms evident; friable; calcareous matrix; some soft carbonate concretions, mostly less than 1 cm. across, and less abundant than below; a few fine faint light olive brown (2.5Y 5/4 to 5/6) mottles; a few thin vertical streaks of dark gray appear to be old root channels, wormholes, or cracks; many fine and very fine tubular pores; clear boundary.   |
| C1<br>11149  | 35 to 42 inches. Mottled grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) in about equal proportions, heavy silt loam; grayish brown color is predominant on weak medium and coarse prism faces; prisms show distinct horizontal and vertical parting to form medium blocky fragments; friable; hard when dry; calcareous; white carbonate concretions 1/2 to 1-1/2 cm. in diameter are common; they are irregular in shape, soft in outer part and hard inside, are larger and more abundant than in horizon above; a few fine dark oxide concretions; many fine and very fine tubular pores; clear boundary. |

## SOIL SURVEY LABORATORY Lincoln, Nebr.

December 1959

SOIL TYPE \*Primghar LOCATION O'Brien County, Iowa  
Silty clay loam

SOIL NOS. S59Iowa-71-2-(1-9) LAB. NOS. 11161-11169

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										TEXTURAL CLASS
		1B1a	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY		2A2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	< 19mm	
0-6	A1p	0.2a	0.2a	0.3a	0.6b	1.4b	60.3	37.0	33.7	28.3	Tr.	sic1
6-11	A12	<0.1	0.2c	0.3a	0.5a	1.4a	60.5	37.1	31.9	30.3	-	sic1
11-17	A3	<0.1	0.2a	0.2a	0.5a	1.2b	62.1	35.8	31.9	31.7	-	sic1
17-25	B21	0.1a	0.3a	0.3a	0.5a	1.8b	64.4	32.6	35.9	30.6	-	sic1
25-35	B22	<0.1	0.1a	0.1a	0.4a	2.7b	67.6	29.1	42.1	28.5	-	sic1
35-44	B3	0.1d	0.3d	0.3d	0.7d	5.2d	70.7	22.7	49.0	27.3	-	s11
44-49	C1	1.7d	2.9d	3.3d	4.8d	5.2d	60.3	21.8	43.4	24.3	5	s11
49-60+	IIC2	3.3d	5.3d	5.2d	10.6d	8.7d	41.3	25.6	30.6	25.0	4	1
63-83	IIC3	3.2d	5.1d	4.8d	10.6d	9.1d	41.4	25.8	31.1	25.2	Tr.	1
pH		ORGANIC MATTER				6C1a	Bulk Density			Water Content		
8C1a			6A1a	6B1a		Free Iron	Field- Moist	30-Cm.	O.D.	Field- Moist	30-Cm.	4B2
1:1	1:5	1:10	ORGANIC CARBON %	NITRO- GEN %	C/N	Fe <sub>2</sub> O <sub>3</sub> %	g/cc	g/cc	g/cc	%	%	15-Bar %
5.8			3.50	0.256	13.7	1.2						15.6
5.8			2.20	0.196	11.2	1.3						15.5
6.0			1.35	0.133	10.2	1.4						15.3
6.1			0.62	0.071	0	1.2						12.0

Soil type: \*Pringhar silty clay loam  
 Soil No.: S59Iowa-71-2-(1-9)  
 Location: 160 yards north of road center and 290 yards east of the southwest corner of SE1/4 of Sec. 34, T97N, R40W, O'Brien County, Iowa.  
 Vegetation and use: Corn; cropland.  
 Slope and land form: Very gently convex slope of 1/2 to 1 percent gradient on broad gently undulating Tazewell till plain.  
 Drainage: Imperfectly drained.  
 Parent material: About 4 feet of loess overlying pebbly clay loam Tazewell till.  
 Collected by: R. H. Jordan and R. L. Juve.  
 Described by: F. J. Carlisle and R. I. Turner, June 11, 1959.

Horizon and  
 Lincoln  
 Lab. Number

A1p 0 to 6 inches. Black (10YR 2/1) light silty clay loam, estimated 30 percent clay; massive in place, crushing to weak fine granular and subangular blocky; friable; rubbed color about 10YR 2/1.2; clear boundary.  
 11161  
 A12 6 to 11 inches. Black (10YR 2/1) light silty clay loam; moderate fine granular; friable; rubbed color about 10YR 2/1.4; gradual boundary.  
 11162  
 A3 11 to 17 inches. Very dark brown (10YR 2/1.5) medium silty clay loam, estimated 33 percent clay; moderate fine subangular blocky and medium granular; friable; in the lower part of the horizon spots or mottles of very dark grayish brown (10YR to 2.5Y 3/2) make up about 20 percent of the material; few fine dark hard oxide concretions; rubbed color 10YR 2.8/2; gradual and slightly wavy boundary.  
 11163  
 B21 17 to 25 inches. Dark grayish brown (10Y 2.5/2) medium silty clay loam, estimated 35 percent clay; moder-



## SOIL SURVEY LABORATORY Lincoln, Nebr.

1/24/58

SOIL TYPE \*Protivin  
loam

LOCATION Howard County, Iowa

SOIL NOS. S56Iowa-45-2-(1-9)

LAB. NOS. 4854-4862

		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										2A2		TEXTURAL CLASS
DEPTH INCHES	HORIZON	1B1a											> 2 (19mm)	
		VERY COARSE SAND 2.1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002				
0-7	Alp	0.9	5.4	5.2	6.4	2.6	48.9	30.6	24.8	29.2	-	cl		
7-10	A12	0.8	4.6	4.7	6.1	2.4	49.7	31.7	24.4	30.0	-	sic1		
10-14	A3	1.3	4.9	4.6	5.9	2.6	49.2	31.5	24.7	29.5	-	sic1		
14-18	R1	1.6	4.3	4.1	6.7	4.5	46.0	32.8	26.9	26.6	Tr.	cl		
18-22	IIB21	3.1	5.7	5.8	11.2	8.3	34.3	31.6	28.8	19.2	3	cl		
22-28	IIB22	1.8	6.3	6.9	12.3	9.5	30.7	32.5	30.4	16.8	Tr.	cl		
28-37	IIB23	3.8	5.7	6.4	11.0	9.1	32.4	31.6	29.1	18.8	Tr.	cl		
37-46	IIB3	2.8	5.8	6.8	12.0	9.6	31.6	31.4	30.4	17.8	Tr.	cl		
46-60	IIC	3.6	6.0	6.4	11.2	9.3	35.3	28.2	32.2	18.8	3	cl		
pH 8C1a		ORGANIC MATTER					ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM SALTS	6E1a	MOISTURE TENSIONS			4B2		
		1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	EST% SALT (BUREAU CUP)	CaCO <sub>3</sub> equiv- alent				15 ATMOS.		
1:1				%	%			%				%		
5.2	5.5	5.7	4.80	.398	12.1		0.3					16.8		
5.4	5.6	5.7	2.71	.235	11.5		0.4					15.1		
5.7	6.2	6.2	1.46	.142	10.3		0.4					13.5		
6.2	6.6	6.6	0.73	.078	9.4		0.4					12.6		
6.5	6.8	6.9	0.38	.038	10.0		0.3					10.8		
6.9	7.2	7.3	0.30	.023	13.0		0.3					10.6		
7.2	7.6	7.6	0.21				0.3					10.9		
7.8	8.2	8.5	0.21				0.5	2				11.3		
8.1	8.5	8.7	0.21				0.5	6				10.6		
5A1a		EXTRACTABLE CATIONS 5B1a				BASE SAT. % NH <sub>4</sub> Ac EXCH.	SATURATION EXTRACT SOLUBLE 6A1				8A			
CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	6N2b	6O2b	6H1a	6P2a	6Q2a	5C1	6P1a	6Q1a	6N1a	6O1a	MOISTURE AT SATU- RATION %			
	Ca	Mg	H	No	K		No	K	Ca	Mg				
milliequivalents per 100g. soil							milliequivalents per liter							
31.2	17.6	3.5	19.0	0.1	0.3	69	0.3	-	1.6	0.9	62.5			
26.7	15.9	3.3	16.1	0.1	0.2	73	0.5	-	2.0	0.6	63.1			
24.1	16.6	4.0	9.4	0.1	0.2	87	0.4	-	1.8	0.6	57.5			

Soil type: \*Protivin loam  
 Soil No.: 856Iowa-45-2-(1-9)  
 Location: Approximately 660 feet east and 400 feet north of southwest corner of SE1/4 of Sec. 15, T99N, R13 W,  
 Howard County, Iowa.  
 Vegetation or crop: Soybeans.  
 Parent material: Firm Iowa till with silty overburden.

Topography: Gently sloping or undulating.

Slope: 1 to 2 percent.

Drainage: Imperfect.

Ground water: None observed due to long period of dry weather.

Permeability: Very slow for the firm till and moderate for the overburden.

Moisture: Slightly moist.

Stoniness: Some pebbles occur through the firm till; a band of pebbles is concentrated just above the firm till; the silty material above this is usually pebble free.

Described by: L. E. Tyler, October 10, 1956.

#### Horizon and

#### Lincoln

#### Lab. Number

A1p 4854	0 to 7 inches. Black (10YR 2/1 moist) gritty silt loam; friable; weak fine granular structure; boundary clear.
A12 4855	7 to 10 inches. Same as above horizon except boundary gradual.
A3 4856	10 to 14 inches. Mixed colors, approximately 60 percent black (10YR 2/1 moist) and 40 percent dark gray brown (2.5Y 4/2 moist); crushed color 10YR 2.5/1 moist; gritty silt loam; friable; weak fine granular structure; boundary gradual.
B1 4857	14 to 18 inches. Mixed colors, approximately 75 percent very dark gray (2.5Y 3/1 moist) and 25 percent dark gray brown (2.5Y 4/2 moist) with the latter color also being the crushed color; light clay loam; slightly firm; moderate fine granular; pebble band at approximately 18 inches; boundary gradual.
IIB21 4858	18 to 22 inches. Dark gray brown (2.5Y 4/2 moist) ped coatings with yellowish brown (10YR 5/6 moist) ped interiors; crushed color olive brown to light olive brown (2.5Y 4.5/3 moist); light clay loam; slightly firm; moderate very fine subangular blocky structure; boundary gradual.
IIB22 4859	22 to 28 inches. Gray (5Y 5/1 moist) ped coatings with few fine faint dark yellowish brown (10YR 4.5/4 moist) mottles and few discontinuous very dark gray (10YR 3/1 moist) deposits of illuviated clay; ped interiors are strong brown (7.5YR 5/6 moist) and dark yellowish brown (10YR 4/4 moist); crushed color olive brown to light olive brown (2.5Y 4.5/3 moist); light to medium clay loam; firm; weak coarse prismatic structure breaking to moderate fine and medium blocky; boundary gradual.
IIB23 4860	28 to 37 inches. Gray (5Y 5/1 moist) ped surfaces with many fine faint yellowish brown (10YR 5/4 moist) mottles and with very dark gray (10YR 3/1 moist) illuviated clay along old root channels; crushed color olive brown (2.5Y 4/3 moist); medium clay loam; firm; moderate medium blocky structure with some large vertical cleavage faces; boundary diffuse.
IIB3 4861	37 to 46 inches. Gray (5Y 5/1 moist) ped surfaces with many fine prominent yellowish brown (10YR 5/6 moist) mottles; there are a few discontinuous streaks of very dark gray (10YR 3/1 moist) illuviated clay along former root channels; crushed color dark yellowish brown to yellowish brown (10YR 4.5/4 moist); light to medium clay loam; firm; weak medium subangular blocky structure; some small soft iron concretions yellowish red (5YR 5/8 moist) in color; this horizon and all above it are leached; boundary clear.
IIC 4862	46 to 60 inches. Mixed colors, approximately 50 percent gray (5Y 5/1 moist) and 50 percent dark brown to brown (10YR 4/3 moist); some iron concretions yellowish red (5YR 4/6 moist); some small soft iron concretions yellowish red (5YR 5/8 moist) in color; this horizon and all above it are leached; boundary clear.

loam

SOIL NOS. S56Iowa-45-3-(1-11) LAB. NOS. 4863-4873

Soil type: \*Protivin loam

Soil No.: S56Iowa-45-3-(1-11)

Location: Approximately 380 feet west and 63 feet south of northeast corner of NW1/4 of NE1/4 of Sec. 9. T90W.

R13W, Howard County, Iowa.

Vegetation or crop: Soybeans.

Parent material: Firm Iowan till with silty overburden.

Physiographic position: Middle of very gentle upland side slope.

Topography: Nearly level.

Slope: 1 to 2 percent.

Drainage: Imperfect.

Ground water: None observed due to long period of dry weather.

Permeability: Very slow for the firm till and moderate for the overburden.

Moisture: Slightly moist.

Stoniness: Some pebbles occur through the firm till; a band of pebbles is concentrated just above the firm till; the silty material above this is usually pebble free.

Described by: L. E. Tyler, October 11, 1956.

Horizon and

Lincoln

Lab. Number

Alp 0 to 6 inches. Black (10YR 2/1 moist) gritty silt loam; friable; weak fine granular structure; boundary clear.

A12 6 to 10 inches. Mixed colors approximately 50 percent black (10YR 2/1 moist) and 50 percent very dark

A3 10 to 15 inches. Mixed colors approximately 50 percent very dark gray (10YR 3/1 moist) and 50 percent

SOIL SURVEY LABORATORY Lincoln, Nebr. October 1963

SOIL TYPE \*Readlyn LOCATION Bremer County, Iowa  
loam

SOIL NOS. S60Iowa-9-2-(1-9) LAB. NOS. 14116-14124

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2.1	COARSE SAND 1.0-5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (19mm)	
0-8	Alp	1.4a	7.6a	9.6	12.9	4.6	41.1	22.8	26.2	24.6	tr.	
8-12	A3	2.1a	8.0	9.3	12.8	4.4	39.8	23.6	24.0	25.2	tr.	
12-17	B1	3.6a	8.2	8.9	13.7	5.1	34.2	26.3	26.0	18.9	3	
17-24	IIB21	4.8	9.1	9.7	16.2	8.1	23.8	28.3	26.4	12.5	4	
24-30	IIB22	2.8	6.9	8.2	16.2	10.3	27.7	27.9	30.7	15.1	6	
30-37	IIB23	4.2	7.6	7.8	15.3	9.8	28.2	27.1	30.0	15.3	5	
37-44	IIB3	4.0	7.3	7.8	15.5	10.4	29.1	25.9	30.8	16.1	6	
44-50	IIC1	4.5b	7.6b	7.8b	15.6b	10.5b	32.8	21.2	31.8	19.0	10	
50-60	IIC2	5.8b	9.2b	10.1b	18.8b	10.3b	31.1	14.7	35.9	14.2	9	
8C1a		6C1a	ORGANIC MATTER				Bulk Density				Moist. Reten.	
pH		Ext. Iron as Fe	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	Field Moist		30 Cm.		O.D.	1/3 ATMOS. Pieces	15 ATMOS. Sieved
1:1		%	% C	%		4B4 % M.	4A1a g/cc.	4B3 % M.	4A1c g/cc.	4A1h g/cc.		
5.5		0.8	2.51	0.228	11	18.4	1.46	23.9	1.42	1.53		10.5
5.2		1.0	1.27	0.124	10							9.4
5.1		1.3	0.65	0.074	9	18.7	1.40	21.7	1.40	1.48		10.3
5.3		1.6	0.35	0.040	9	17.6	1.48	19.3	1.48	1.58		10.4
5.8		2.0	0.24			14.4	1.64	16.3	1.60	1.73		10.4
6.7		1.7	0.13			12.7	1.71	14.9	1.67	1.78		10.1
7.2		1.7	0.12									9.8
7.9		1.5	0.08			14.5	1.77	15.1	1.76	1.84		8.8
8.0		0.8	0.05			12.2	1.90	12.8	1.83	1.94		5.9
5A1a		EXTRACTABLE CATIONS 5B1a				Base Sat.		8D1	8D3	Carbonate		
CATION EXCHANGE	6N2b	6O2b	6H1a	6P2a	6Q2a	5A3a	5C1	5C3	Ratio	as CaCO <sub>3</sub>	6E1c	

Soil type: \*Readlyn loam  
 Soil No.: S60Iowa-9-2-(1-9)  
 Location: 878 feet north and 605 feet west from SE corner of Sec. 34, T91N, R11W, Bremer County, Iowa.  
 Vegetation: Clover-timothy meadow. Parent material: Gritty overburden over Iowan till.

Slope: 1 percent. Drainage: Imperfectly drained.  
 Permeability: Moderate in gritty overburden; moderately slow in Iowan till.  
 Ground water: None within 60 inches. Moisture: Slightly moist.  
 Described by: D. E. Slusher and J. D. Wisland. October 11, 1960.

Horizon and  
 Lincoln Lab. No.

A<sub>1</sub> 0 to 8 inches. Black (10YR 2/1)<sup>1</sup> loam; cloddy, breaking to weak fine and very fine subangular blocky structure; slightly firm; numerous worm casts; a few clear uncoated quartz grains (fine-sand size) on ped surfaces; clear boundary.

A<sub>3</sub> 8 to 12 inches. Very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2) heavy loam; weak fine subangular blocky structure with platy tendency breaking to moderate fine granules; friable; common fine faint black (10YR 2/1) and very dark grayish brown (10YR 3/2) mixing and worm casts and a few fine distinct dark grayish brown (10YR 4/2) worm casts; a few clear uncoated quartz grains (fine-sand size) on ped surfaces; gradual boundary.

B<sub>1</sub> 12 to 17 inches. Mixed (in equal proportions) very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) heavy loam; weak fine subangular blocky and moderate fine granular structure; friable:

October 1963

Bremer County, Iowa

14138-14148

1B1a		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)		3A1
VEDV	VEDV	VEDV		2A2

Soil type: \*Readlyn loam

Soil No.: S60Iowa-9-4-(1-11)

Location: 489 feet north and 724 feet east of SW corner of NW1/4 SW1/4 of Sec. 2, T91N, R12W, Bremer County, Iowa.

Vegetation: Corn.

Parent material: Gritty overburden over Iowan till.

Physiographic position: Upland level till plain on top of a slope slightly convex to the west by southwest; near crest.

Slope: Less than 1 percent.

Drainage: Imperfectly drained.

Permeability: Moderate in gritty overburden; moderately slow in Iowan till.

Ground water: None within 72 inches.

Moisture: Slightly moist.

Described by: R. I. Turner, October 11, 1960.

Horizon and  
Lincoln Lab. No.

Alp 0 to 9 inches. Black (10YR 2/1)<sup>1</sup> heavy loam (approaching silt loam); slightly cloddy, breaking to weak fine subangular blocky structure and weak to moderate fine granules; slightly firm; clear boundary.

A3 9 to 14 inches. Black (10YR 2/1) to very dark gray (10YR 3/1) heavy loam; weak fine subangular blocky structure breaking to moderate fine granules; friable; a few black (10YR 2/1) stains from above; kneaded color black (10YR 2/1) to very dark gray (10YR 3/1); common fine imbedded tubular pores; gradual boundary.

IIB1 14 to 19 inches. Mixed (in about equal proportions) dark grayish brown (10YR 4/2) and very dark gray (10YR 3/1) loam; weak to moderate fine subangular blocky structure; friable; the very dark gray colors



SOIL SURVEY LABORATORY Lincoln, Nebr. 1/24/58

SOIL TYPE \*Riceville LOCATION Howard County, Iowa  
loam

SOIL NOS. S56Iowa-45-6-(1-11) LAB. NOS. 4894-4904

=====

Soil type: \*Riceville loam  
 Soil No.: 856Iowa-45-6-(1-11)  
 Location: Approximately 480 feet south and 205 feet east of west side of field gate which is approximately 975 feet west of northeast corner of NW1/4 of Sec. 33, T99N, R13W, Howard County, Iowa.  
 Vegetation or crop: Red clover and timothy meadow.  
 Parent material: Firm Iowan till with silty overburden.  
 Physiographic position: Upland; concave portion of a side slope as slope approaches waterway; also slightly depressed in terms of a lateral traverse of the side slope.  
 Topography: Gently undulating.  
 Slope: 1 to 2 percent.  
 Drainage: Imperfect.  
 Ground water: None observed within 63 inches due to long period of dry weather.  
 Permeability: Very slow for the firm till and moderate for the overburden.  
 Moisture: Slightly moist.  
 Stoniness: Some pebbles occur through the firm till, a band of pebbles is concentrated just above the firm till and the silty material above this is usually pebble free.  
 Described by: L. E. Tyler, October 12, 1956.

Horizon and  
 Lincoln  
 Lab. Number

Ap 4894	0 to 8 inches. Black (10YR 2/1 moist) gritty silt loam; friable; moderate very fine granular structure to cloddy; boundary abrupt.
A21 4895	8 to 12 inches. Dark gray brown (10YR 4/2 moist) with many fine distinct dark brown (10YR 3/3 to 4/3 moist) mottles; crushed color black (10YR 2/1 moist); dry color gray to light brownish gray (10YR 6/1 to 5/2 dry); gritty silt loam; friable; weak fine platy structure breaking to weak fine subangular blocky; worm casts present; boundary gradual.
A22 4896	12 to 16 inches. Dark gray brown (10YR 4/2 moist) with many fine distinct dark yellowish brown (10YR 4/4 moist) mottles, common fine distinct strong brown (7.5YR 5/8 moist) mottles, and few fine prominent very dark gray (N 3/0 moist) iron-manganese concretions; crushed color dark yellowish brown (10YR 4/4 moist) to olive brown (2.5Y 4/4 moist); heavy loam; slightly firm; mixed weak medium platy and weak fine subangular blocky structure; few pebbles at approximately 16-inch depth; boundary gradual.
IIAB 4897	16 to 20 inches. Gray (2.5Y 5/1 moist) ped surfaces with common fine prominent yellowish brown (10YR 5/6 to 5/8 moist) mottles; crushed color yellowish brown (10YR 5/6 moist); dry peds gray (10YR 6/1); light clay loam; slightly firm; weak medium subangular blocky structure; few thin discontinuous clay skins may be present; boundary gradual.
IIB21 4898	20 to 24 inches. Gray to light gray (5Y 6/1 moist) ped surfaces with common medium distinct strong brown (7.5YR 5/6 moist) mottles and streaks of very dark gray (N 3/0 moist) transported clay; ped interiors are mixed gray (5Y 5/1 moist) and strong brown (7.5YR 5/8 moist); crushed color yellowish brown (10YR 5/6 moist); medium clay loam; moderate to strong medium prismatic structure breaking to moderate to strong medium blocky; firm; boundary gradual. Clay skins difficult to identify.
IIB22 4899	24 to 29 inches. Both prism and block surfaces are gray (5Y 5/1 moist) with block faces having many medium distinct dark brown to brown (7.5YR 4/4 moist) mottles; interiors of peds are mixed gray (5Y 5/1 moist) and strong brown (7.5YR 4/6 moist); dry prism faces white (N 8/0 dry); light to medium clay loam; firm; moderate to strong coarse prismatic structure breaking to moderate medium blocky; clay skins difficult to find; boundary gradual.
IIB23 4900	29 to 34 inches. Prism and block surfaces both gray (5Y 5/1 moist) with block surfaces having many medium distinct dark brown to brown (10YR 4/3 moist) mottles; ped interiors mixed dark brown to strong brown (7.5YR 4/4 to 4/6 moist) and gray (5Y 5/1); crushed color dark yellowish brown (10YR 4/4 moist); light to medium clay loam; firm; moderate coarse prismatic structure breaking to weak medium subangular blocky; few streaks of dark-colored transported clay present; boundary gradual.
IIB24 4901	34 to 41 inches. Some large cleavage faces gray (5Y 5/1 moist) in color and some lesser-defined faces of same color but with many medium distinct dark brown to brown (10YR 4/3 moist) mottles; few iron-



Soil type: \*Riceville loam  
Soil No.: S56Iowa-45-8-(1-10)  
Location: Approximately 1035 feet north and 260 feet west of southeast corner of Sec. 33, T99N, R13W, Howard County, Iowa.  
Vegetation or crop: Red clover and timothy seeding.  
Parent material: Firm Iowan till with silty overburden.  
Physiographic position: Upland; concave portion of a side slope as a slope approaches waterway.  
Topography: Gently undulating.  
Slope: 1 to 2 percent.  
Drainage: Imperfect.  
Ground water: None observed within 63 inches due to long period of dry weather.  
Permeability: Very slow for the firm till and moderate for the overburden.  
Moisture: Slightly moist.  
Stoniness: Some pebbles occur through the firm till; a band of pebbles is concentrated just above the firm till and the silty material above this is usually pebble free; occasional boulders are found.  
Described by: L. E. Tyler, October 15, 1956.

Horizon and  
Lincoln  
Lab. Number

Ap	0 to 7 inches. Black (10YR 2/1 moist) gritty silt loam; friable; moderate fine granular structure;
4915	boundary clear.
A21	7 to 11½ inches. Dark gray brown (10YR 4/2 moist) with some very dark gray (10YR 3/1 moist) and

## SOIL SURVEY LABORATORY Lincoln, Nebr.

December 1959

SOIL TYPE <sup>\*Sac</sup> silty clay loam LOCATION Clay County, Iowa

SOIL NOS. S59Iowa-21-5-(1-8) LAB. NOS. 11170-11177

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	< 0.002	
0-7	Alp	0.2	0.7	0.8	1.1	1.6	58.1	37.5	33.5	26.7	-	sic1
7-11	A3	0.2	0.6	0.7	0.9	1.6	57.6	38.4	33.3	26.3	Tr.	sic1
11-18	B1	0.1	0.5	0.6	0.9	2.8	57.7	37.4	36.4	24.5	-	sic1
18-25	B21	0.2	1.2	1.5	2.5	3.4	57.6	33.6	37.8	24.4	-	sic1
25-28	B22	0.7	2.6	3.2	5.2	4.5	52.1	31.7	36.9	22.1	Tr.	sic1
28-33	IIB23	1.6	5.7	7.6	11.9	5.4	35.8	32.0	27.7	19.2	Tr.	cl
33-44	IIB3	3.2a	4.2a	3.6a	7.1a	6.1a	42.1	33.7	25.7	26.5	5	cl
44-57+	IIC	3.0a	4.1a	3.3a	7.1a	6.1a	42.0	34.4	25.7	26.5	7	cl
pH		ORGANIC MATTER				6C1a	Bulk Density			Water Content		
8C1a		6A1a	6B1a			Free Iron Fe <sub>2</sub> O <sub>3</sub>	4A1a Field- Moist	4A1c 30-Cm g/cc	4A1h O.D. g/cc	4B1 Field- Moist %	4B3 30-Cm %	4B2 15-Bar %
1:1	1.5	1:10	ORGANIC CARBON %	NITRO- GEN %	C/N	%	g/cc	g/cc	g/cc	%	%	%
5.7			3.14	0.283	11.1	1.4						14.7
5.6			2.45	0.221	11.1	1.5	1.23	1.19	1.34	23	30	15.2
5.7			1.57	0.138	11.4	1.5						14.7
6.0			0.77	0.079	10	1.5	1.46	1.43	1.54	19	24	13.1

Soil type: \*Sec silty clay loam

Soil No.: S59Iowa-21-5-(1-8)

Location: 305 feet west of road center and 135 yards north of northeast corner of the SE1/4 of SE1/4 of Sec. 16, T95N, R38W, Clay County, Iowa.

Vegetation and use: Legume hay; cropland.

Slope and land form: Loess-mantled Tazewell till plain; convex slope adjacent to drainage way to southeast; to the northwest the surface rises very slightly to nearly level Primghar soils. Slope to south is 2 percent at site grading to 3 percent; slope to east is 1 percent at site grading to 2 percent.

Drainage: Well drained.

Parent material: About 28 inches of loess overlying clay loam glacial till.

Collected by: R. H. Jordan and R. L. Juve.

Described by: F. J. Carlisle and R. I. Turner, June 11, 1959.

Horizon and

Lincoln

Lab. Number

Alp 0 to 7 inches. Black (10YR 2/1, 3/2 dry) light silty clay loam, estimated 28 percent clay; massive breaking to weak fine granular; friable; hard when dry; rubbed color 10YR 2/1; the few fine sand grains are mostly free of coatings; clear boundary.

A3 7 to 11 inches. Mixed black (10YR 2/1) and very dark grayish brown (10YR 3/2) light silty clay loam; weak very fine subangular blocky; friable; rubbed color 10YR 2.5/2; gradual boundary.

Bl 11 to 18 inches. Mixed colors apparently due to worm activity, predominantly very dark grayish brown (10YR 3/2) with some dark brown (10YR 4/3) and black (10YR 2.5/1) medium silty clay loam, estimated

colors predominantly on ped surfaces; gradual boundary.

B21 18 to 25 inches. Dark brown (10YR 4/3) medium silty clay loam, estimated 31 percent clay; weak medium to coarse prismatic breaking to weak medium to coarse subangular blocky; ped faces are slightly darker (about 3.5/2.5) than ped interiors; friable; common fine tubular pores; gradual boundary.

B22 25 to 28 inches. Dark brown (10YR 4/3) light silty clay loam; weak medium to coarse prismatic breaking to weak medium subangular blocky; ped faces 10YR 4/2 with distinct smooth shiny patches; friable; common fine tubular pores; contains some pebbles and more fine sand than horizons above but is still loess-like; clear boundary.

IIB23 28 to 33 inches. Dark brown (10YR 4/3) medium clay loam; structure as above; slightly firm; common very fine and few fine tubular pores; contains a few small carbonate concretions but the matrix is noncalcareous; few fine dark soft oxide concretions; few pebbles; clear boundary.

IIB3 33 to 44 inches. Dark yellowish brown (10YR 4/4) medium clay loam; weak medium to coarse prismatic breaking to very weak blocky; smooth shiny brown patchy films on prism faces and on some block faces; firm; common fine faint grayish brown (10YR 5/2) mottles and few dark oxide patches or dendrites; common soft and hard carbonate concretions 1 to 3 mm. in diameter; matrix calcareous; common fine tubular pores; gradual boundary.

IIC 44 to 57 inches plus. Yellowish brown (10YR 4.5/4) clay loam, estimated 32 percent clay; carbonate concretions 1 to 3 mm. in diameter are common; matrix calcareous; pebbles 1/2 to 3 inches in diameter have carbonate coatings about 1-mm. thick on lower surfaces; few dark oxide patches or dendrites; common fine tubular pores; firm; glacial till.

Notes: Colors are for fully moist soil unless indicated otherwise. Roots decrease gradually in numbers with depth. They are abundant in the A horizon, common in the upper B horizon, and scarce in the C horizon. pH with chlorphenol red and bromthymol blue:

4 inches - 5.8

22 inches - 6.4

SOIL SURVEY LABORATORY Lincoln, Nebr.

December 1959

SOIL TYPE \*Sac

LOCATION

Clay County, Iowa

silt loam

SOIL NOS.

S59Iowa-21-6-(1-8)

LAB. NOS.

11178-11185

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a	3A1								2A2	
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 < 19mm	
0-8	Alp	0.5	1.1	1.2	1.7	1.9	56.8	36.8	33.3	26.2	Tr.	sic1
8-13	A3	0.1	0.6	1.0	1.6	1.8	56.7	38.2	32.9	26.4	Tr.	sic1
13-18	B1	0.2	0.9	1.1	1.8	2.4	56.8	36.8	34.7	25.4	Tr.	sic1
18-25	B21	0.3	1.3	1.7	3.1	3.3	56.3	34.0	36.8	24.4	Tr.	sic1
25-28	IIB22	1.5	4.1	4.5	7.8	5.3	45.1	31.7	32.9	21.2	Tr.	cl
28-33	IIB23	1.6	3.8	4.5	8.8	7.0	38.8	35.5	28.0	22.3	Tr.	cl
33-47	IIB3	3.9 a	4.0 a	3.4 a	7.2 a	7.5 a	45.8	28.2	28.6	28.7	5	cl
47-60+	IIC	4.0 a	4.8 a	4.3 a	8.8 a	8.2 a	44.3	25.6	29.5	27.9	7	l
pH		ORGANIC MATTER				6C1a	Bulk Density		Water Content			
8C1a		6A1a	6B1a			Free Iron Fe2O3	4A1a Field- Moist	4A1c 30-Cm. g/cc	4A1h O.D. g/cc	4B1 Field- Moist	4B3 30-Cm. %	4B2 15-Bar %
1:1	1:5	1:10	ORGANIC CARBON %	NITRO- GEN %	C/N	%	g/cc	g/cc	g/cc	%	%	%
6.0			2.96	0.258	11.5	1.4						14.8
5.9			2.10	0.184	11.4	1.5	1.29	1.26	1.38	23	29	15.0
6.0			1.49	0.138	10.8	1.6						14.4
6.1			0.79	0.078	10	1.6	1.43	1.42	1.52	18	23	13.3
6.4			0.46			1.8						11.9
6.8			0.34			2.5	1.48	1.46	1.57	18	20	13.6
8.0			0.12			2.2	1.74	1.67	1.75	11	17	12.3
8.0			0.10			2.3						11.7
5A1a	EXTRACTABLE CATIONS					5B1a	5C3	5B1a	5A3a	8D3	6E1a	MOISTURE
CATION	6N2h	6O2h	6H1a	6P2a	6Q2a	BASE SAT.	Base					

Soil type: \*Sac silt loam  
 Soil No.: S59Iowa-21-6-(1-8)  
 Location: 350 yards south and 380 feet east of the northwest corner of SW1/4 of Sec. 28, T95N, R37W, Clay County, Iowa.  
 Vegetation and use: Corn; cropland.  
 Slope and land form: Loess-mantled Tazewell till plain. Gently convex ridge top with gradient about 1-1/2 percent at site and grading to 2 to 3 percent gradient to east, south, and west. To the northeast the ridge rises very slightly to nearly level Primghar soils.  
 Drainage: Well drained.  
 Parent material: About 28 inches of loess overlying clay loam glacial till.  
 Collected by: R. H. Jordan and R. L. Juve.  
 Described by: F. J. Carlisle and R. I. Turner, June 12, 1959.

Horizon and  
 Lincoln  
 Lab. Number

Alp 0 to 8 inches. Black (10YR 2/1 to 2.5/1, 3/2 dry) silt loam borderline to silty clay loam; massive in place breaking to weak fine granular and subangular blocky; friable; rubbed color 10YR 2/1.7; a few fine spots of 10YR 2/2; some fine sand grains are coated dark brown, others uncoated; clear boundary.  
 11178  
 A3 8 to 13 inches. Very dark brown (10YR 2/2) with some mixing of very dark grayish brown and black (10YR 3/2 and 2/1, light silty clay loam, estimated 29 percent clay; moderate fine to medium granular and weak fine subangular blocky; friable; rubbed color about 10YR 2.4/2; gradual boundary.  
 11179  
 B1 13 to 18 inches. Very dark brown (about 60 percent 10YR 2/2) and dark brown (about 40 percent 10YR 3/2.5)  
 11180

boundary.

B21 18 to 25 inches. Dark brown (10YR 3.5/3) medium silty clay loam, estimated 34 percent clay, with some very dark gray in 3 to 4 mm. thick tongues in the upper part, apparently due to worm activity; weak to moderate fine subangular blocky with faces shiny but not smooth; friable; common fine tubular pores; clear boundary.  
 11181  
 IIB22 25 to 28 inches. Dark brown (10YR 4/3) gritty silty clay loam; weak medium prismatic breaking to weak fine subangular blocky; slightly firm; numerous small pebbles; many fine and few medium to coarse tubular pores; gradual boundary.  
 11182  
 IIB23 28 to 33 inches. Dark brown (10YR 4/3) medium clay loam, estimated 32 percent clay; weak prismatic breaking to weak fine subangular blocky; slightly firm under weak pressure, firm under strong pressure; a few hard carbonate concretions in lower part but matrix is noncalcareous; smooth shiny dark brown patches on many red faces and on some subangular pebbles; gradual boundary.  
 11183



## SOIL SURVEY LABORATORY Beltsville, Md.

SOIL TYPE Sharpsburg LOCATION Adair County, Iowa  
silty clay loam

SOIL NOS. S55Iowa-1-3 LAB. NOS. 56232 - 56248

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		2.0	0.85	0.425	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	> 2	
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY				
0-6	A1p	0.1	0.2	0.1	0.3	1.5	61.9	35.9	35.1	28.5		
6-9	A3B1	-	0.1	0.1	0.2	1.4	60.1	38.1	31.8	29.8		
9-12	B21	-	0.1	0.1	0.3	1.1	61.5	36.9	31.6	31.3		
12-15	B22	-	0.1	0.1	0.2	1.0	63.1	35.5	31.3	32.9		
15-18	B22	-	-	-	-	0.8	64.2	35.0	31.9	33.1		
18-21	B22	-	-	-	0.1	0.6	65.5	33.8	31.7	34.5		
21-24	B3	-	-	-	0.1	0.6	66.2	33.1	32.4	34.5		
24-27	B3	-	-	-	0.1	0.9	67.4	31.6	33.9	34.5		
27-30	B3	-	-	-	0.1	0.8	68.3	30.8	33.2	36.0		
30-33	B3	-	-	-	0.1	0.7	69.5	29.7	35.8	34.5		
33-36	B3	-	-	-	0.1	0.7	69.6	29.6	33.8	36.6		
36-42	C1	-	-	-	0.1	0.8	69.5	29.6	36.2	34.2		
42-48	C1	-	-	0.1	0.3	1.1	69.2	29.3	38.8	31.7		
48-54	C1	-	-	0.1	0.4	1.4	71.4	26.7	40.8	32.3		
54-60	C1	-	0.1	0.2	0.6	1.7	71.7	25.7	41.1	32.7		
60-66	C1	-	0.1	0.1	0.5	1.6	71.5	26.2	41.2	32.2		
66-72	D	-	0.1	0.1	0.3	0.8	72.1	26.6	37.8	35.3		
pH												
ORGANIC MATTER												
ESTS. SALT (BUREAU CUP)												
ELECTRI- CAL CONDUCTIVITY EC x 10 <sup>3</sup> MILLIMOS PER CM 25°C.												
MOISTURE TENSIONS												
1/10 ATMOS. 1/3 ATMOS. 15 ATMOS.												
8C1a	1:5	1:10	ORGANIC CARBON	NITRO- GEN	C/N							
1:1			%	%								
5.9			1.80	.162	11.1							
5.7			1.40	.124	11.3							
5.7			1.00	.096	10.4							
5.8			0.78	.077	10.1							
6.1			0.56	.062	9.0							
5.9			0.47	.053	8.9							
5.9			0.38	.044	8.6							
5.9			0.32	.041	7.8							
6.0			0.26	.036	7.2							
6.1			0.27	.034	7.9							
6.1			0.22	.032								
6.2			0.20	.028								
6.3			0.16	.026								
6.4			0.14	.024								
6.5			0.12	.021								
6.5			0.12	.021								
6.5			0.11	.021								
EXTRACTABLE CATIONS												
503 Base Sat. % on Sum												
SATURATION EXTRACT SOLUBLE												
Na K												
milliequivalents per 100g. soil												
Cations												
milliequivalents per liter												
MOISTURE AT SATU- RATION												
%												
27.7	15.4	3.0	8.5	0.2	0.7	69						
27.9	14.8	3.9	8.5	0.2	0.4	70						
32.4	15.8	8.1	7.7	0.2	0.6	76						
32.5	16.4	8.4	6.9	0.2	0.6	78						
31.8	16.4	8.4	6.1	0.3	0.6	80						
27.9	14.2	7.2	5.6	0.3	0.6	80						
28.1	13.8	7.7	5.6	0.4	0.6	80						
29.0	14.8	8.1	5.2	0.3	0.6	82						
29.1	15.3	8.1	4.8	0.3	0.6	83						
28.9	15.5	7.9	4.6	0.3	0.6	84						
29.0	15.5	7.9	4.6	0.4	0.6	84						
28.9	15.2	8.8	3.9	0.4	0.6	86						
27.9	15.2	7.8	3.9	0.4	0.6	86						
26.3	14.1	7.3	3.9	0.4	0.6	85						
26.3	14.1	7.3	3.9	0.4	0.6	85						

Soil type: Sharpsburg silty clay loam

Soil No.: 855Iowa-1-3

Location: Greenfield Quadrangle; southeast quarter of northeast quarter of Sec. 13, T76N, R32W, Adair County, Iowa.

Slope: 6 percent gently convex, also convex at right angles to slope direction.

Collected by and date: R. B. Daniels and F. J. Carlisle, November 4, 1955.

Horizon and Beltsville Lab. Number	Sample Depth	
Alp 56232	0-6	0 to 6 inches. Very dark brown (10YR 2.5/2) cloddy, friable, silty clay loam; clear to A3B1.
A3B1 56233	6-9	6 to 9 inches. Very dark gray brown (10YR 3/2) and dark brown (10YR 3.5/3) weak fine subangular blocky, friable, silty clay loam; gradual to B21.
B21 56234	9-12	9 to 12 inches. Dark brown (10YR 3/3) with few very dark gray brown (10YR 3/2) weak to moderate fine subangular blocky, friable, silty clay loam; thin discontinuous clay skins; gradual to B22.
B22 56235 56236 56237	12-15 15-18 18-21	12 to 21 inches. Dark brown (10YR 3.5/3) in upper part grading to brown (10YR 4/2.5) in lower part, weak to moderate fine subangular blocky, friable, silty clay loam; few fine faint gray and browner mottles in lower 2 inches of horizon; thin discontinuous clay skins; gradual diffuse to B3.
B3 56238 56239 56240 56241 56242	21-24 24-27 27-30 30-33 33-36	21 to 36 inches. Dark gray brown (10YR 4/2) to (10YR 4/2.5), few fine gray brown (2.4Y 5/2) and strong brown mottles and few fine distinct soft dark oxide concretions, weak medium blocky, friable, silty clay loam; diffuse to C1.
C1 56243 56244 56245 56246 56247	36-42 42-48 48-54 54-60 60-66	36 to 66 inches. Mottled gray brown (2.5Y 5/2) and dark gray brown (10YR 4/2), massive, with tendency for very weak coarse prisms, friable, heavy silt loam to light silty clay loam; gradual to D.
D 56248	66-72	66 to 72 inches. Light brownish gray (2.5Y 6/2) with common fine and medium distinct strong brown grading to dark reddish brown mottles, massive, moderately friable, light silty clay loam; this horizon is deoxidized loess.

SOIL TYPE Sharpsburg LOCATION Adair County, Iowa  
 silty clay loam

 SOIL NOS. S55Iowa-1-4 LAB. NOS. 56249 - 56265

1R1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1													
DEPTH INCHES	HORIZON	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY					TEXTURAL CLASS
		2.1	1.0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	> 2		
0-6	A1p	0.1	0.2	0.2	0.4	1.3	63.0	34.8	33.1	31.4			
6-9	A3B1	-	0.2	0.2	0.4	1.2	61.8	36.2	31.2	32.0			
9-12	B21	-	0.1	0.1	0.2	1.3	60.3	38.0	30.2	31.5			
12-15	B21	-	0.2	0.1	0.2	1.4	60.2	37.9	30.5	31.2			
15-18	B21	-	0.2	0.1	0.3	1.6	60.7	37.1	31.7	30.8			
18-21	B22	-	0.1	0.1	0.3	1.4	61.9	36.2	31.3	32.2			
21-25	B22	-	0.1	0.1	0.4	1.4	63.5	34.5	37.1	32.0			
25-28	B31	-	0.1	0.1	0.3	1.3	65.3	32.9	34.4	32.4			
28-31	B31	-	0.2	0.3	0.5	1.4	64.5	33.1	33.2	33.0			
31-35	B31	-	0.1	0.2	0.3	1.5	65.2	32.7	33.4	33.5			
35-39	B32	-	0.1	0.2	0.3	1.3	65.8	32.3	34.3	33.0			
39-43	B32	-	0.1	0.2	0.3	1.4	65.3	32.7	34.4	32.5			
43-48	C	-	-	0.1	0.3	1.2	65.7	32.5	34.2	33.1			
48-54	C	-	0.1	0.2	0.4	1.3	67.7	30.3	37.6	31.6			
54-60	C	-	0.1	0.2	0.3	1.5	68.8	29.1	39.9	30.6			
60-66	C	-	0.1	0.2	0.4	1.1	69.3	28.9	36.0	34.6			
66-72	C	-	0.1	0.2	0.3	1.2	69.8	28.4	36.3	34.9			
pH		ORGANIC MATTER					ELECTRI- CAL CONDUCT- IVITY EC-10 <sup>3</sup> MILLIMHOS PER CM 25°C		MOISTURE TENSIONS				
8C1a	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N	EST% SALT (BUREAU CUP)	CaCO <sub>3</sub> equiv- alent	GYP SUM me./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.		
1:1			%	%			%		%	%	%		
5.7			1.82	.163	11.2								
5.7			1.75	.151	11.6								
5.8			1.04	.095	10.9								
5.8			0.82	.078	10.5								
5.9			0.65	.065	10.0								
5.8			0.52	.054	9.6								
5.6			0.41	.047	8.7								
5.6			0.34	.042	8.1								
5.7			0.30	.039	7.7								
5.8			0.24	.033									
6.1			0.20	.032									
6.1			0.18	.030									
6.3			0.18	.029									
6.3			0.15	.026									
6.4			0.14	.025									
6.4			0.14	.025									
6.4			0.14	.024									
5A3a	EXTRACTABLE CATIONS 5B1a					5C3	SATURATION EXTRACT SOLUBLE						

Soil type: Sharpsburg silty clay loam

Soil No.: 855Iowa-1-4

Location: Greenfield Quadrangle; southeast quarter of northeast quarter of Sec. 13, T76N, R32W, Adair County, Iowa.

Slope: 2 percent straight, slightly convex at right angles to slope direction.

Collected by and date: R. B. Daniels and F. J. Carlisle, November 4, 1955.

# Horizon and

## Beltsville Sample

### Lab. Number Depth

ALp		0 to 6 inches. Very dark brown (10YR 2/2) cloddy, friable, light to medium silty clay loam;
56249	0-6	abrupt to A3B1.
A3B1		6 to 9 inches. Very dark brown (10YR 2/2) with about one-third dark brown (10YR 3/3), weak
56250	6-9	fine and very fine subangular blocky, friable, silty clay loam; clear to B21.
B21		9 to 18 inches. Dark brown (10YR 3/3) weak to moderate fine to very fine subangular blocky
56251	9-12	approaching granular, friable, silty clay loam, with considerable mixing of very dark gray
56252	12-15	brown (10YR 3/2) in upper four inches apparently iron earthworm activity; thin discontinuous
56253	15-18	clay skins; gradual to B22.
B22		18 to 25 inches. Brown (10YR 4/2,5) with few fine faint strong brown mottles. weak to moder-

B31		25 to 35 inches. Dark gray brown (10YR 4/2) with common fine faint gray brown (2.5Y 5/2) and
56256	25-28	few fine distinct strong brown and yellowish brown mottles, moderate medium blocky, moderately
56257	28-31	friable, light to medium silty clay loam, arranged in weak medium prisms; gradual to B32.
56258	31-35	
B32		35 to 43 inches. Mottled dark gray brown and gray brown (10YR 4/2 and 2.5Y 5/2) with common
56259	35-39	fine distinct strong brown mottles and few fine distinct dark oxides, weak medium coarse,
56260	39-43	blocky, friable, medium to light silty clay loam arranged in weak, medium prisms; gradual to C1.
C		43 to 72 inches. Mottled gray brown and brown (2.5Y 5/2 and 7.5YR 4/4) and strong brown with
56261	43-48	few fine distinct dark oxides, massive, friable, light silty clay loam to heavy silt loam.
56262	48-54	
56263	54-60	
56264	60-66	
56265	66-72	

SOIL SURVEY LABORATORY Baltaville, Mi.SOIL TYPE Sharpsburg LOCATION Adair County, Iowa  
silty clay loamSOIL NOS. S55Iowa-1-5 LAB. NOS. 56266 56282

		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										3A1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Soil type: Sharpsburg silty clay loam

Soil No.: S55Iowa-1-5

Location: Greenfield Quadrangle; northeast corner of southeast quarter of northeast quarter of southeast quarter of Sec. 18, T76N, R31W, Adair County, Iowa.

Slope: 2 percent straight, slightly convex at right angles to slope direction.

Collected by and date: R. B. Daniels and F. J. Carlisle, November 5, 1955.

# Horizon and

## Beltsville

### Sample

#### Lab. Number Depth

Alp		0 to 6 inches. Very dark brown (10YR 2/1.5) cloddy, breaking to fine granular, friable, light silty clay loam; clear to A12.
56266	0-6	
A12		6 to 12 inches. Very dark gray to black (10Y 2.5/1) weak medium granular, friable, light to medium silty clay loam; gradual to A3R1.
56267	6-9	
56268	9-12	
A3R1		12 to 15 inches. Very dark brown (10YR 2/2) with some mixing of dark brown (10YR 3.5/3), moderate fine subangular blocky, friable, medium silty clay loam; gradual to B21.
56269	12-15	
B21		15 to 19 inches. Dark brown (10YR 3/3) with about 25 percent very dark gray brown and very dark gray (10YR 3/2 and 10YR 3/1), moderate fine subangular blocky, moderately friable, silty clay loam; thin continuous clay skins; gradual boundary to B22.
56270	15-19	
B22		19 to 30 inches. Dark brown (10YR 3/3) moderate fine subangular blocky, moderately firm, silty clay loam; thin continuous clay skins; few fine faint mottles in lower three inches; gradual boundary to B3.
56271	19-22	
56272	22-26	
56273	26-30	
B3		30 to 43 inches. Dark brown (10YR 3/3) grading with depth to dark gray brown (10YR 4/2) with common fine gray brown (2.5Y 5/2) and strong brown mottles, moderate to strong (dry), medium blocky, moderately firm, light to medium silty clay loam; gradual diffuse to C1.
56274	30-33	
56275	33-36	
56276	36-39	
56277	39-43	
C1		43 to 72 inches. Mottled yellowish brown and gray brown (10YR 5/4 and 2.5Y 5/2) with common very fine dark oxides, massive, friable, heavy silt loam to light silty clay loam; thin continuous clay skins on vertical cleavage faces to a depth of about 50 inches.
56278	43-48	
56279	48-54	
56280	54-60	
56281	60-66	
56282	66-72	

## SOIL SURVEY LABORATORY Beltsville, Md.

SOIL TYPE Sharpsburg LOCATION Adair County, Iowa

silty clay loam, gray  
subsoil variant

SOIL NOS. S55Iowa-1-6 LAB. NOS. 56283 - 56299

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a					3A1					
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-6	A1p	0.1	0.2	0.1	0.3	1.8	60.7	36.8	33.8	28.9		
6-9	A12	-	0.1	0.1	0.2	1.0	59.8	38.8	31.3	29.6		
9-12	A12	-	0.1	0.1	0.2	1.1	60.1	38.4	31.6	29.7		
12-15	A3B1	-	0.1	0.1	0.2	1.1	60.7	37.8	31.6	30.3		
15-18	B2	-	0.1	0.1	0.2	1.1	62.4	36.1	31.9	31.6		
18-21	B2	-	0.2	0.1	0.2	1.1	63.4	35.0	32.1	32.5		
21-24	B3	-	0.4	0.2	0.2	1.1	64.5	33.6	31.8	33.9		
24-27	B3	-	0.4	0.4	0.5	1.1	65.6	32.0	32.6	34.4		
27-30	B3	-	0.3	0.2	0.3	1.2	67.3	30.7	33.5	35.2		
30-34	B3	-	0.1	0.1	0.2	1.0	68.8	29.8	35.9	34.0		
34-38	B3	-	0.1	0.1	0.2	1.0	67.7	30.9	34.7	34.1		
38-43	C1	-	0.2	0.2	0.3	1.3	67.9	30.1	35.2	34.2		
43-48	C1	-	0.2	0.1	0.3	1.1	68.8	29.5	35.5	34.6		
48-54	C1	-	0.2	0.2	0.4	1.1	70.8	27.3	36.7	35.4		
54-60	C1	-	0.2	0.2	0.5	1.3	70.8	27.0	39.4	33.0		
60-66	C1	-	0.3	0.3	0.8	1.9	69.3	27.4	38.4	33.3		
66-72	C1	-	0.1	0.2	0.5	1.2	69.8	28.2	37.6	33.7		
pH		ORGANIC MATTER					ELECTRI- CAL CONDUCTI- VITY EC-103 MILLIMHOS PER CM 25°C.	MOISTURE TENSIONS				
8C1a	1:5	1:10	6A1a ORGANIC CARBON %	6B1a NITRO- GEN %	C/N	ESTD SALT (BUREAU CUP)		CoCO <sub>2</sub> equiv- alent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
5.7			2.15	.201	10.7							
5.6			1.80	.154	11.7							
5.7			1.48	.131	11.3							
5.8			1.16	.106	10.9							
5.8			0.74	.074	10.0							
6.0			0.59	.064	9.2							
6.2			0.47	.054	8.7							
6.2			0.38	.044	8.6							
6.5			0.31	.036	8.6							
6.6			0.23	.032								
6.6			0.20	.030								
6.7			0.19	.029								
6.9			0.16	.027								
7.0			0.14	.024								
7.0			0.12	.023								
7.1			0.12	.023								
6.9			0.12	.023								
5A3a	EXTRACTABLE CATIONS					5B1a	5C3	SATURATION EXTRACT SOLUBLE				MOISTURE AT SATU- RATION %
CATION EXCHANGE CAPACITY Sum	6N2b Co	6O2b Mg	6H1a H	6P2a Na	6Q2a K	Base Sat. % on Sum Cations	Na	K				
	milliequivalents per 100g. soil						milliequivalents per liter					
33.6	15.1	6.7	11.0	0.1	0.7	67						
33.5	14.6	7.5	10.5	0.3	0.7	68						
34.7	15.5	7.7	10.3	0.4	0.8	70						
32.4	15.1	7.9	8.7	0.3	0.4	73						
31.7	15.3	8.3	7.2	0.3	0.6	77						
32.0	15.5	8.7	6.9	0.3	0.6	78						
30.3	15.6	8.5	5.4	0.2	0.6	82						
31.0	15.8	8.7	5.6	0.3	0.6	82						
28.0	15.2	7.9	4.1	0.2	0.6	85						
26.9	15.1	7.9	3.1	0.2	0.6	88						
26.9	15.0	8.1	2.9	0.3	0.6	89						
26.0	15.5	8.1	2.8	0.3	0.6	90						
26.4	15.1	7.8	2.6	0.3	0.6	90						
26.1	15.0	7.7	2.5	0.3	0.6	90						
25.7	14.8	7.9	2.1	0.3	0.6	92						
26.2	14.4	7.7	2.3	0.2	0.6	91						
25.1	14.9	7.7	1.6	0.3	0.6	94						

Soil type: Sharpsburg silty clay loam, gray subsoil variant

Soil No.: S55Iowa-1-6

Location: Greenfield Quadrangle; southeast quarter of northeast quarter of Sec. 13, T76N, R32W, Adair County, Iowa.

Slope: 6 percent straight, slightly convex at right angles.

Collected by and date: R. B. Daniels and F. J. Carlisle, November 4, 1955.

Horizon and Beltsville Lab. Number	Sample Depth	
A1p 56283	0-6	0 to 6 inches. Very dark brown (10YR 2/1.5) weak medium to fine blocky (fragmental), friable, silty clay loam; clear to A12.
A12 56284 56285	6-9 9-12	6 to 12 inches. Very dark brown (10YR 2/2), moderate fine subangular blocky and fine to very fine granular, friable, light to medium silty clay loam; gradual to A3B1.
A3B1 56286	12-15	12 to 15 inches. Mixed very dark brown and dark gray brown (10YR 2/2 and 10YR 4/2.5), moderate fine and very fine subangular blocky, friable, light to medium silty clay loam; gradual to B2.
B2 56287 56288	15-18 18-21	15 to 21 inches. Dark brown (10YR 3/3 to 10YR 3.5/3) with few fine faint gray brown and dark yellowish brown (10YR 5/2 and 10YR 4/4) mottles, moderate to weak fine subangular blocky, friable, medium to light silty clay loam; thin discontinuous clay skins; gradual boundary to B3.
B3 56289 56290 56291 56292 56293	21-24 24-27 27-30 30-34 34-38	21 to 38 inches. Dark gray brown (10YR 4/2.5) with common fine and medium gray brown (2.5Y 5/2) and strong brown grading to yellowish red and dark reddish brown mottles, weak to moderate fine and medium blocky, friable, medium to light silty clay loam; thin discontinuous clay skins; diffuse to C1.
C1 56294 56295 56296 56297 56298 56299	38-43 43-48 48-54 54-60 60-66 66-72	38 to 72 inches. Gray brown (2.5Y 5/2) with common prominent strong brown to yellowish red and dark reddish brown mottles, coarse prismatic, moderately friable, light silty clay loam with thin continuous clay skins on vertical prism faces; vertical faces extend to 6 feet and at this depth are very coarse.

Notes: Colors of lower B2 and B3 horizons suggest profile may be less well-drained than S55Iowa-1-3, -4, and -5.



# SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Sharpsburg silty clay LOCATION Adair County, Iowa  
loam, 5-13% slopes

SOIL NOS. 856 Iowa-1-11

LAB. NOS. 5783-5787

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1b	3A1						2A2			
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 < 76mm	
0-5	A <sub>1</sub> D	0.0	0.1	0.2	0.4	0.8	60.7	37.8	31.6	30.1	< 1	sic1
5-9	AB	0.0	0.0	0.1	0.3	0.6	61.4	37.6	30.5	31.6	< 1	sic1
9-22	B <sub>2</sub>	0.0	0.0	0.0	0.0	0.0	67.3	32.7	32.4	34.9	< 1	sic1
22-37	B <sub>3</sub>	0.0	0.0	0.1	0.2	0.6	68.6	30.5	30.9	38.4	< 1	sic1
37-51	C	0.0	0.0	0.1	0.3	0.6	71.2	27.8	37.8	34.2	< 1	sic1/sil
pH		ORGANIC MATTER			ELECTRI- CAL CON- DUCTIV- ITY EC x 10 <sup>3</sup> MILLIMHOS PER CM 25°C.		MOISTURE TENSIONS					
8C1a	1:5	1:10	6A1a ORGANIC CARBON	NITRO- GEN	C/N	EST% SALT (BUREAU CUP)	CaCO <sub>3</sub> equiv- alent	GYPSUM mg./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.	
1:1			%	%			%		%	%	%	
6.1			1.59									
5.8			0.98									
6.0			0.44									
6.2			0.23									
6.2			0.14									
5A3a	EXTRACTABLE CATIONS					5B1a	BASE SAT. %	SATURATION EXTRACT SOLUBLE			MOISTURE AT SATU- RATION %	
CATION EXCHANGE CAPACITY	6N2a	6O2b	6H1a	6P2a	6Q2a			Na	K			
Ca	Mg	H	Na	K								
Sum	milliequivalents per 100g. soil					5C3	milliequivalents per liter					%
33.9	17.7	7.3	8.3	0.1	0.5	75						
33.3	17.0	8.1	7.6	0.1	0.5	77						

Soil type: Sharpsburg silty clay loam, 5 to 13 percent slopes  
 Soil No.: 856Iowa-1-11  
 Location: Greenfield Quadrangle; 429 feet north and 162 feet west of southwest corner of southwest quarter of southwest quarter of northwest quarter of Section 17, T76N, R31W, Adair County, Iowa.  
 Slope: 9 percent, gently convex.  
 Vegetation: Cultivated field.  
 Collected by and date: R. B. Daniels, August 28, 1956.

Horizon and  
 Beltsville  
 Lab. Number

A1p 0 to 5 inches. Very dark brown (10YR 2/2 to 2.5/2) friable medium to heavy silty clay loam; cloddy

AB  
 5784 5 to 9 inches. Very dark gray brown (10YR 3/2) friable heavy silty clay loam with some mixing of very dark brown and dark brown (10YR 2/2 and 3/3); weak fine and very fine subangular blocky structure with thin continuous coatings, identification as clay skins doubtful; very dark gray brown (10YR 3/2) crushed and dark gray brown to gray brown (10YR 4.5/2) dry; clear boundary to B2.

B2  
 5785 9 to 22 inches. Sampled 10 to 20 inches. Dark brown (10YR 3.5/3) friable heavy silty clay loam with some mixing of very dark gray brown (10YR 3/2) in upper part; weak fine subangular blocky structure with thin continuous clay skins; dark brown (10YR 4/3) crushed and brown to pale brown (10YR 5.5/3) dry; gradual boundary to B3.

B3  
 5786 22 to 37 inches. Sampled 24 to 34 inches. Dark gray brown to dark brown (10YR 4/2.5) friable medium silty clay loam with few to common fine gray brown (2.5Y 5/2) and strong brown mottles; weak medium blocky structure with thin continuous clay skins in upper part becoming discontinuous on horizontal surfaces in lower part of the horizon; dark yellowish brown (10YR 4/4) crushed and pale brown (10YR 6/3) dry; gradual boundary to C.

C  
 5787 37 to 51 inches. Sampled 41 to 51 inches. Brown (10YR 5/3) friable massive light silty clay loam with common fine and medium gray brown (2.5Y 5/2) and few to common fine dark brown and strong brown (7.5YR 4/4 and 5/6) mottles; thin continuous clay skins along cleavage planes; dark yellowish brown to yellowish brown (10YR 4.5/4) crushed; mottled pale brown to very pale brown (10YR 6.5/3), light brown gray (2.5Y 6/2) and reddish yellow (7.5YR 7/6) dry.

SOIL SURVEY LABORATORY  
Beltsville, Maryland

LOCATION Polk County, Iowa

SOIL TYPE Sharpsburg silt loam

LAB NOS. 52239-52247

SURVEY NOS. S51Iowa-77-7-(1-9)

LABORATORY NUMBER	DEPTH INCHES	HORIZON	1B1b	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1							2A2		TEXTURAL CLASS
			VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY ≤ 0.002	INTERNATIONAL		> 2	
										II 0.2-0.02	III 0.02-0.002		
52239	0-10	Ap	0.1	0.1	0.1	0.3	1.4	67.5	30.5	36.0	33.1	0	
52240	10-13	A3	0.0	0.1	0.1	0.2	1.0	65.8	32.8	33.3	33.7	0	
52241	13-18	B1	0.0	0.0	0.1	0.2	1.1	63.0	35.6	31.4	32.8	0	
52242	18-22	B21	0.0	0.0	0.1	0.2	0.9	62.9	35.9	30.0	33.9	0	
52243	22-25	B22	0.0	0.1	0.1	0.2	1.0	61.6	37.0	29.6	33.2	0	
52244	25-29	B23	0.0	0.0	0.1	0.2	0.8	62.4	36.5	28.7	34.6	0	
52245	29-33	B3	0.0	0.1	0.1	0.3	0.9	63.6	35.0	30.9	33.8	0	
52246	33-48	C1	0.0	0.0	0.1	0.2	1.5	64.2	34.0	34.1	31.7	0	
52247	48-60	C2	0.0	0.0	0.0	0.2	1.2	66.3	32.3	35.1	32.5	0	
	pH			ORGANIC MATTER			FREE IRON OXIDE Fe <sub>2</sub> O <sub>3</sub> %			BULK DENSITY g/cc	MOISTURE RETAINED AT		
	8CLa H <sub>2</sub> O 1:1		6ALa ORGANIC CARBON %	NITROGEN %	C/N	1/10 ATMOS. %					1/3 ATMOS. %	15 ATMOS. %	
52239	6.4			2.44									
52240	5.2			2.21									
52241	5.6			1.74									
52242	5.6			1.30									
52243	5.6			1.08									
52244	5.6			0.77									
52245	5.7			0.60									
52246	5.8			0.34									
52247	5.9			0.32									
	5A3a CATION EXCHANGE CAPACITY	EXTRACTABLE CATIONS 5B1a					BASE SATURAT- ION% 5C3 (SUM)						
	6N2b Ca	6O2b Mg	6P2a Na	6Q2a K	6H1a H								
	(SUM)	milliequivalents per 100g soil					(SUM)						
52239	27.3	16.6	3.2	0.1	0.8	6.6	76						
52240	27.2	13.3	3.6	0.1	0.6	9.6	65						
52241	28.4	13.7	4.9	0.1	0.6	9.1	68						
52242	29.4	14.0	5.7	0.1	0.6	9.0	69						
52243	29.8	14.6	6.7	0.1	0.5	7.9	73						
52244	29.7	14.9	7.2	0.1	0.5	7.0	76						
52245	29.9	14.9	7.4	0.1	0.5	7.0	76						
52246	28.7	15.0	7.4	0.1	0.5	5.7	80						
52247	27.9	15.2	7.2	0.2	0.5	4.8	83						

Soil type: Sharpsburg silt loam

Soil No.: S51Iowa-77-7-(1-9)

Location: NE1/4 SE1/4 SW1/4 of Sec. 26, T78N, R25W, Bloomfield Township, Polk County, Iowa, 75 feet from a point on north-south gravel road 1000 feet north of south section line.

Position: Very gently sloping broad ridgetop, about 1000 feet wide, in dissected Peorian loess-mantled region, slightly more than 1 mile south of southwestern Des Moines city limits.

Vegetation: Soybeans 1951, original vegetation prairie grasses.

Collected by and date: Dean Einspahr and Ralph McCracken, December 6, 1951.

# Horizon and

Beltsville

Lab. Number

Ap 52239	0 to 10 inches. Very dark grayish brown (10YR 3/2) firm moderate medium granular heavy silt loam.
A3 52240	10 to 13 inches. Mottled very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) firm moderate medium granular heavy silt loam.
B1 52241	13 to 18 inches. Dark brown (10YR 4/3) firm moderate medium granular silty clay loam.
B21 52242	18 to 22 inches. Dark brown (10YR 4/3) firm moderate fine and medium subangular blocky silty clay loam.
B22 52243	22 to 25 inches. Dark brown (10YR 4/3) firm moderate medium subangular blocky silty clay loam.
B23 52244	25 to 29 inches. Dark brown (10YR 4/3) firm weak medium subangular blocky silty clay loam.
B3 52245	29 to 33 inches. Dark brown (10YR 4/3) with a few medium contrast fine mottles and spots of light yellowish brown (10YR 6/4), also a few iron stains; firm, weak subangular blocky light silty clay loam.
C1 52246	33 to 48 inches. Yellowish brown (10YR 5/4) fine and medium mottles of light yellowish brown (10YR 6/4) and iron stains; friable; massive, heavy silt loam.
C2 52247	48 to 60 inches. Yellowish brown (10YR 5/4) medium mottles and spots of light yellowish brown (2.5Y 6/4) and reddish yellow (7.5YR 6/6); firm; massive, heavy silt loam.

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Shelby clay loam, LOCATION Adair County, Iowa  
deep to carbonates

SOIL NOS. 856Iowa-1-5 LAB. NOS. 5739-5747

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1b VERY COARSE SAND 2.1 0.4 0.4	COARSE SAND 1-0.5 1.7 1.7	MEDIUM SAND 0.5-0.25 2.8 2.6	FINE SAND 0.25-0.10 5.8 5.0	VERY FINE SAND 0.10-0.05 4.2 3.9	SILT 0.05-0.002 53.4 52.2	CLAY < 0.002 31.7 31.2	0.2-0.02 35.9 33.1	0.02-0.002 24.8 25.8	2A2 > 2 < 76mm 1 1	
0-4	A <sub>11</sub>	0.4	1.7	2.8	5.8	4.2	53.4	31.7	35.9	24.8	1	sic1
1-0	A <sub>2</sub>	0.4	1.7	2.6	5.0	3.9	52.2	31.2	33.1	25.8	1	sic1

Soil type: Shelby clay loam, deep to carbonates

Soil No.: 856Iowa-1-5

Location: Greenfield Quadrangle; 297 feet west and 190 feet south of southeast corner of southwest quarter of northeast quarter of southeast quarter of Section 18, T76N, R31W, Adair County, Iowa.

Slope: 12 percent, convex.

Vegetation: Bluegrass.

Collected by and date: R. B. Daniels, July 12, 1956.

# Horizon and

## Beltsville

### Lab. Number

A11 5739	0 to 4 inches. Very dark brown (10YR 2/2) friable medium silty clay loam to clay loam; moderate to strong very fine granular structure; clear boundary to A12.
A12 5740	4 to 9 inches. Very dark brown (10YR 2/2) friable to firm medium silty clay loam to medium clay loam; moderate to strong fine granular structure; clear boundary to AB.
AB 5741	9 to 13 inches. Very dark gray brown (10YR 3/2) friable to slightly firm medium clay loam to silty clay loam with some mixing of dark brown (10YR 3/3); moderate fine subangular blocky structure; gradual boundary to B21.
B21 5742	13 to 22 inches. Dark brown (10YR 4/3) firm medium to heavy clay loam; moderate fine subangular blocky structure with thin continuous clay skins; gradual boundary to B22.
B22 5743	22 to 30 inches. Dark brown to dark yellowish brown (10YR 4/3.5) firm heavy clay loam; weak to moderate fine and medium subangular blocky structure with medium continuous clay skins; few fine strong brown mottles; gradual boundary to B31.
B31 5744	30 to 37 inches. Dark gray brown to dark brown (10YR 4/2.5) firm medium to heavy clay loam; interior of peds are gray brown, dark yellowish brown, and strong brown (2.5Y 5/2, 10YR 4/4, and 7.5YR 5/6); weak medium blocky structure with thin to medium continuous clay skins; gradual boundary to B32.
B32 5745	37 to 43 inches. Dark gray brown to dark brown (10YR 4/2.5) firm medium clay loam with few fine to

structure with thin discontinuous clay skins on horizontal surfaces; abrupt boundary to B33.

B33 5746	43 to 54 inches. Dark gray brown (10YR 4/2) firm medium calcareous clay loam with common olive gray to gray (5Y 5/1.5) streaks which range up to 2 inches in length and 1/4-inch in width; common fine to medium strong brown (7.5YR 5/6) mottles; very weak medium and coarse blocky with thin continuous clay skins on vertical surfaces and thin discontinuous clay skins on horizontal surfaces; few white firm carbonate concretions less than 1/4-inch in diameter; diffuse boundary to C.
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54 to 72 inches. Mottled dark gray brown to brown and gray brown (10YR 4/2.5 to 2.5Y 5/2) firm

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Shelby clay loam, deep to carbonates LOCATION Adair County, Iowa

SOIL NOS. 856 Iowa-1-6 LAB. NOS. 5748-5755

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1b		3A1					2A2			
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2 < 76mm	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002		
0-7	A <sub>1p</sub>	1.2	4.0	6.6	15.0	10.0	34.8	28.4	36.0	17.3	4	cl
7-11	A <sub>B</sub>	1.4	3.9	6.0	13.7	9.7	32.6	32.7	33.4	16.6	1	cl
11-17	B <sub>21</sub>	1.5	4.6	6.0	12.0	8.0	32.7	35.2	30.1	17.4	1	cl
17-23	B <sub>22</sub>	1.7	3.9	5.1	10.9	8.7	33.7	36.0	29.4	19.3	2	cl
23-34	B <sub>31</sub>	1.2	4.2	5.7	11.9	9.2	33.9	33.9	31.0	18.9	2	cl
34-48	B <sub>32</sub>	2.0	4.3	5.6	11.3	8.3	36.4	32.1	31.0	20.0	1	cl
48-60	C <sub>21</sub>	2.2	4.3	5.6	13.0	11.0	36.5	27.4	34.6	20.8	2	cl/l
72-82	C <sub>23</sub>	1.8	4.4	5.4	10.9	9.1	38.2	30.2	31.2	22.5	3	cl
pH		ORGANIC MATTER				EST% SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM 25°C.	6E1e CoCO <sub>3</sub> equiv- alent	GYPSUM mg./100g. SOIL	MOISTURE TENSIONS		
8C1a	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N					1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
	1:1		%	%				%		%	%	
5.6			2.56	0.221	11.6							
5.5			1.65	0.155	10.6							
5.4			1.02	0.103	9.9							
5.7			0.49	0.056	8.8							
5.6			0.25	0.036	6.9							
6.4			0.16	0.030								
7.8			0.09					6				
7.7			0.08					9				
5A3a	EXTRACTABLE CATIONS 5B1a					BASE SAT. %	SATURATION EXTRACT SOLUBLE				MOISTURE AT SATU- RATION %	
CATION EXCHANGE CAPACITY Sum	6N2d Co	6O2b Mg	6H1a H	6P2a Na	6Q2a K		No	K				
milliequivalents per 100g. soil						5C3	milliequivalents per liter				%	
26.1	13.1	3.4	9.1	0.1	0.4	65						
26.0	13.6	4.0	8.0	0.1	0.3	69						
25.5	14.1	4.0	7.0	0.1	0.3	73						
29.4	14.4	4.1	10.4	0.1	0.4	65						
21.5	14.5	3.5	3.1	0.1	0.3	86						
26.3	16.0	2.6	7.3	0.1	0.3	72						
calcareous												
calcareous												

Soil type: Shelby clay loam, deep to carbonates  
 Soil No.: S56Iowa-1-6  
 Location: Greenfield Quadrangle; 297 feet east and 129 feet south of northwest corner of southwest quarter of  
 • southeast quarter of northwest quarter of Section 18, T76N, R31W, Adair County, Iowa.  
 Slope: 15 percent, convex.  
 Vegetation: Cultivated field.  
 Collected by and date: R. B. Daniels and G. H. Simonson, July 31, 1956.

Horizon and  
 Beltsville  
 Lab. Number

Alp 5748	0 to 7 inches. Very dark brown (10YR 2/2) friable light silty clay loam to light clay loam; weak fine granular structure; black to very dark brown (10YR 2/1.5) crushed and dark gray (10YR 4/1) dry; clear boundary to AB.
AB 5749	7 to 11 inches. Very dark gray brown (10YR 3/2) slightly firm light to medium silty clay loam to clay loam with some mixing of very dark brown and dark brown (10YR 2/2 and 3/3); moderate fine subangular blocky structure; very dark gray brown (10YR 3/2) crushed and dark gray to dark gray brown (10YR 4/1 and 4/2) dry; clear boundary to B21.
B21 5750	11 to 17 inches. Dark brown (10YR 3.5/3) firm medium clay loam with some mixing of very dark brown (10YR 2/2) along channels; moderate fine and very fine subangular blocky structure with thin continuous clay skins; clear boundary to B22.
B22 5751	17 to 23 inches. Dark yellowish brown (10YR 4/4) firm medium to heavy clay loam with some mixing of very dark brown (10YR 2/2) along channels in the upper part; weak to moderate fine subangular blocky structure with medium continuous clay skins; clear boundary to B31.
B31 5752	23 to 34 inches. Dark brown (10YR 4/3) very firm medium clay loam with few fine faint gray and few coarse strong brown and reddish yellow (7.5YR 5/6 and 6/8) mottles; weak fine and medium blocky structure with thin to medium continuous clay skins; gradual boundary to B32.
B32 5753	34 to 48 inches. Sampled 36 to 46 inches. Dark brown (10YR 4/3) very firm medium clay loam with common medium gray brown (2.5Y 5/2) and few fine strong brown mottles; weak to very weak medium to coarse blocky structure with medium clay skins on vertical surfaces of weak medium prisms and thin continuous on the blocky beds becoming discontinuous in the lower part; clay skins become thin but continuous in lower part of horizon on prisms; clear boundary to C21.
C21 5754	48 to 60 inches. Sampled 48 to 58 inches. Mottled gray brown and dark yellowish brown (2.5Y 5/2 and 10YR 4/4) firm to very firm massive calcareous light clay loam; thin discontinuous clay skins on vertical surfaces; common white soft to very hard carbonate concretions less than 1/4-inch in diameter; gradual boundary to C22.
C22	60 to 72 inches. Mottled gray brown and yellowish brown (2.5Y 5/2 and 10YR 5/6) friable massive calcareous sandy loam; gradual boundary to C23.
C23 5755	72 to 82 inches. Yellowish brown (10YR 5/4) firm massive calcareous light clay loam; common medium gray brown (2.5Y 5/2) and few fine strong brown mottles.



# SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Shelby clay loam, moderately shallow t LOCATION Adair County, Iowa  
carbonates

SOIL NOS. 856Iowa-1-7

LAB. NOS. 5756-5761

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS	
		1B1b		3A1					2A2				
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (76mm)		
0-6	A <sub>1</sub>	0.6	2.0	2.7	4.8	3.6	49.5	36.8	29.8	25.8	<1	sic1	
6-10	AB	0.4	1.7	2.3	4.6	4.0	49.7	37.3	29.2	27.1	<1	sic1	
10-19	B <sub>2</sub>	0.9	2.8	4.0	8.2	6.5	42.0	35.6	30.8	22.2	2	cl	
19-33	B <sub>31</sub>	1.3	8.0	2.6	9.8	7.5	34.3	36.5	26.2	21.0	1	cl	
33-48	B <sub>32</sub>	1.6	6.2	3.7	10.3	8.4	35.2	34.6	28.1	21.2	2	cl	
48-60	C	1.8	5.7	4.2	9.9	7.8	37.2	33.4	28.8	21.7	2	cl	
pH		ORGANIC MATTER				ESTR SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHOS PER CM @ 25°C	6E1e		MOISTURE TENSIONS			
8C1a		1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN			C/N	CaCO <sub>3</sub> equiv- alent	GYPSUM me./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1				%	%				%	%	%	%	%
5.9				2.33	0.204	11.4							
5.6				1.18	0.119	9.9							
5.8				0.50	0.062	8.1							
6.2				0.23	0.039								
7.7				0.10	0.031			6					
7.7				0.06				9					
5A3a		EXTRACTABLE CATIONS 5B1a				BASE SAT. %	SATURATION EXTRACT SOLUBLE				MOISTURE AT SATU- RATION %		
6M2d		6O2b	6H1a	6P2a	6Q2a		Na	K					
CATION EXCHANGE CAPACITY Sum		Co	Mg	H	Na	K							
milliequivalents per 100g. soil						5C3	milliequivalents per liter				%		
33.1	18.8	5.0	8.7	0.1	0.5	74							
32.2	17.9	5.7	8.0	0.1	0.5	75							
28.6	15.4	5.1	7.6	0.1	0.4	73							

Soil type: Shelby clay loam, moderately shallow to carbonates

Soil No.: S56Iowa-1-7

Location: Greenfield Quadrangle; 165 feet west and 17 feet south of northeast corner of southwest quarter of northeast quarter of southeast quarter of Section 18, T76N, R31W, Adair County, Iowa.

Slope: 4 percent along axis of interfluvium, but sharply convex transverse to the interfluvium axis.

Vegetation: Bluegrass.

Collected by and date: R. B. Daniels, July 27, 1956.

# Horizon and

## Beltsville

### Lab. Number

A1 5756	0 to 6 inches. Very dark brown (10YR 2/2) friable medium clay loam to medium silty clay loam; weak to moderate fine granular structure; clear boundary to AB.
AB 5757	6 to 10 inches. Very dark gray brown (10YR 3/2) friable medium clay loam to medium silty clay loam with some mixing of black and dark brown (10YR 2/1 and 3/3); moderate fine and very fine subangular blocky structure; clear boundary to B2.
B2 5758	10 to 19 inches. Dark brown (10YR 4/3) slightly firm medium clay loam with some mixing of very dark gray brown and very dark brown (10YR 3/2 and 2/2) along channels; moderate fine subangular blocky structure with thin to medium continuous clay skins; clear boundary to B31.
B31 5759	19 to 33 inches. Sampled 21 to 31 inches. Brown (10YR 4.5/3) firm medium clay loam; few to common fine and medium gray (5Y 5.5/1) and few fine strong brown mottles; weak medium blocky structure with thin continuous clay skins; abrupt boundary to B32.
B32 5760	33 to 48 inches. Sampled 35 to 45 inches. Dark yellowish brown (10YR 4/4) firm calcareous light to medium clay loam with common medium to coarse gray (5Y 5.5/1) mottles and streaks, and few fine strong brown mottles; weak medium to coarse blocky structure with thin continuous clay skins becoming discontinuous in the lower part of the horizon; common white soft to very hard carbonate concretions and limestone fragments less than 3/4-inch in diameter; gradual to diffuse boundary to C.
C 5761	48 to 60 inches. Sampled 50 to 60 inches. Brown (1Y 5/3) firm massive calcareous light to medium clay loam with common gray (5Y 5.5/1) streaks less than 1/4-inch wide and common fine to coarse strong brown (7.5YR 5/6) mottles; many white soft to very hard carbonate concretions and limestone fragments less than 1-inch in diameter; thin discontinuous clay skins on vertical cleavage planes.

# SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Shelby clay loam, LOCATION Adair County, Iowa  
moderately shallow to carbonates

SOIL NOS. S56Iowa-1-8 LAB. NOS. 5762-5769

DEPTH INCHES	HORIZON	1B1b	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2		
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	(6mm)		
0-9	A1	1.6	6.6	6.1	15.1	10.1	32.5	28.0	35.3	15.6	2	cl	
9-14	AB	2.2	5.6	6.7	14.1	9.7	30.9	30.8	32.7	15.7	3	cl	
14-22	B21	2.4	5.7	6.7	12.6	9.6	31.0	32.0	30.2	17.4	3	cl	
22-30	B22	3.0	5.9	6.7	12.9	10.1	31.8	29.6	30.7	18.3	3	cl	
30-36	B23	2.0	5.2	5.7	12.3	9.5	38.6	26.7	33.4	21.8	4	1/cl	

Soil type: Shelby clay loam, moderately shallow to carbonates  
 Soil No.: S56Iowa-1-8  
 Location: Greenfield Quadrangle; 412 feet east and 33 feet north of southwest corner of southwest quarter of southwest quarter of northeast quarter of Section 18, T76N, R31W, Adair County, Iowa.

Slope: 12 percent, slightly convex.  
 Vegetation: Bluegrass.  
 Collected by and date: R. B. Daniels, August 1, 1956.

Horizon and  
 Beltsville  
 Lab. Number

A1 5762	0 to 9 inches. Very dark brown (10YR 2/2) friable light to medium clay loam; moderate fine and very fine subangular blocky; very dark brown (10YR 2/2) crushed; clear boundary to AB.
AB 5763	9 to 14 inches. Very dark gray brown (10YR 3/2) friable medium to heavy clay loam with mixing of very dark brown (10YR 2/2) along vertical channels and some mixing of dark brown (10YR 3/3); moderate fine and very fine subangular blocky structure with discontinuous coatings on ped surfaces, identification as clay skins doubtful; very dark gray brown to dark gray brown (10YR 3.5/2) crushed; clear boundary to B21.
B21 5764	14 to 22 inches. Dark brown (10YR 4/3) slightly firm medium clay loam with some mixing of very dark gray brown (10YR 3/2) along vertical channels; moderate to strong fine subangular blocky structure with thin continuous clay skins; dark brown (10YR 4/3) crushed; clear boundary to B22.
B22 5765	22 to 30 inches. Dark brown (10YR 4/3) slightly firm medium clay loam; weak to moderate fine subangular blocky structure with thin to medium continuous clay skins; yellowish brown (10YR 5/4) crushed; very few white carbonate concretions less than 1/4-inch in diameter in the lower part but the matrix is leached; abrupt boundary to B23.

B23 30 to 35 inches. Dark yellowish brown (10YR 4/4) friable medium clay loam; moderate fine subangular blocky structure with thin to medium continuous clay skins; yellowish brown (10YR 5/4) crushed; very few white carbonate concretions less than 1/4-inch in diameter in the lower part but the matrix is leached; abrupt boundary to B24.

# SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL NOS. 856Iowa-1-9 LAB. NOS. 5770-5776

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)									3A1			TEXTURAL CLASS
		1B1b								2A2				
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY		> 2				
		2.1	1.0-5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	( $\leq 76\mu$ )			
0-6	A <sub>1</sub>	1.3	4.8	6.5	12.7	9.2	33.7	31.8	32.7	17.2	3	cl		
6-10	AB	2.2	3.9	5.6	11.2	8.6	33.2	35.3	31.1	17.0	2	cl		
10-14	B <sub>21</sub>	1.7	4.3	5.5	11.0	9.4	32.6	35.5	29.5	18.5	2	cl		
14-19	B <sub>22</sub>	3.0	4.1	5.3	10.4	9.0	35.8	32.4	28.8	21.7	4	cl		
19-28	B <sub>31</sub>	3.0	4.9	5.2	10.3	7.7	38.7	30.2	30.0	22.1	4	cl		
28-34	B <sub>32</sub>	2.1	4.8	5.5	10.5	8.8	38.5	29.8	30.4	22.8	4	cl		
34-48	C	2.4	4.9	6.1	12.1	9.8	40.0	24.7	34.4	22.2	3	1		
pH		ORGANIC MATTER				ELECTRI- CAL CONDUCT- IVITY EC $\times 10^3$ MILLIMHOS PER CM 25°C.		6Ele	MOISTURE TENSIONS					
8C1a		1:5	1:10	6A1a		EST% SALT (BUREAU CUP)		CoCO <sub>3</sub> equiv- alent	GYP SUM me./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.		
1:1				ORGANIC CARBON	NITRO- GEN	C/N		%		%	%	%		
5.9				1.99										
6.2				1.38										
7.0				1.12										
7.7				0.58										
7.8				0.30				10						
7.8				0.19				13						
								13						

Soil type: Shelby clay loam, thin solum variant

Soil No.: 856Iowa-1-9

Location: Greenfield Quadrangle; 380 feet west and 363 feet south of northeast corner of the northeast quarter of northeast quarter of northwest quarter of Section 18, T76N, R31W, Adair County, Iowa.

Slope: 4 percent, flat along axis of interfluvial, but sharply convex at right angles to the axis of the interfluvial.

Vegetation: Bluegrass.

Collected by and date: R. B. Daniels, F. J. Carlisle and G. H. Simonson, July 24, 1956.

Horizon and

Beltville

Lab. Number

- A1  
5770 0 to 6 inches. Very dark brown (10YR 2/2) friable light clay loam; dark gray (10YR 4/1) when dry; weak to moderate fine granular structure; clear boundary to AB.
- AB  
5771 6 to 10 inches. Very dark gray brown (10YR 3/2) friable medium clay loam with some mixing of dark brown (10YR 4/3); dark gray brown (10YR 4/2) when dry; moderate fine and very fine subangular blocky structure; clear boundary to B21.
- B21  
5772 10 to 14 inches. Dark brown (10YR 3/3) friable medium clay loam with an appreciable mixing of very dark gray brown (10YR 3/2) and some dark brown (10YR 4/3); moderate fine subangular blocky structure with thin continuous clay skins; occasional white carbonate concretions less than 1/8-inch in diameter, but the matrix is leached; abrupt boundary to B22.
- B22  
5773 14 to 19 inches. Dark brown (10YR 4/3) friable calcareous medium clay loam with some mixing of yellowish brown (10YR 5/4) and very few very dark brown (10YR 3/2) colors which appear to be worm channel fillings; few fine dark brown (7.5YR 4/4 to 4/6) mottles; weak to moderate fine subangular blocky structure with thin continuous clay skins; common white carbonate concretions with a maximum diameter of 1/2-inch and a range of consistence from soft to hard; gradual boundary to B31.
- B31 19 to 28 inches. Dark brown and yellowish brown (10YR 4/3 and 5/4) in about equal proportions; friable

# SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Shelby clay loam, thin solum variant LOCATION Adair County, Iowa

SOIL NOS. S56Iowa-1-10 LAB. NOS. 5777-5782

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS	
		1B1b						3A1					2A2
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2		
		2.1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	( $\leq 76\mu$ )		
0-4	A <sub>1</sub>	1.5	5.0	6.3	11.3	7.1	35.0	33.8	30.9	17.3	3	cl	
4-9	A <sub>2</sub>	2.0	3.7	5.7	10.7	8.1	32.5	37.3	28.6	17.9	3	cl	
9-18	B <sub>2</sub>	2.5	4.4	5.3	9.4	7.5	38.4	32.5	28.4	22.9	5	cl	
18-29	B <sub>31</sub>	2.8	4.7	5.3	9.4	8.2	38.1	31.5	27.6	23.9	2	cl	
29-43	B <sub>32</sub>	2.4	4.5	5.4	9.7	8.8	37.1	32.1	28.5	22.9	3	cl	
43-60	C	2.0	4.2	5.3	10.0	8.2	37.6	32.7	29.5	21.8	2	cl	
pH		ORGANIC MATTER				EST% SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC $\times 10^3$ MILLIMHOS PER CM @25°C.	6E1e CaCO <sub>3</sub> equiv- alent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS			
8C1a	1:5	1:10	6A1a ORGANIC CARBON	NITRO- GEN	C/N					1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.	
1:1			%	%						%	%	%	
6.9			1.93										
7.1			1.25										
7.7			0.54					13					
7.7			0.27					15					
7.8			0.10					12					
7.8			0.09					11					
5A3a	EXTRACTABLE CATIONS 5B1a					BASE SAT. %	SATURATION EXTRACT SOLUBLE				MOISTURE AT SATU- RATION %		
CATION EXCHANGE CAPACITY	6N2d	6O2b	6H1a	6P2a	6Q2a		No		K				
Ca	Mg	H	Na	K	milliequivalents per 100g. soil		milliequivalents per liter		%				
Sum						503							
20.2	13.9	2.3	3.4	0.1	0.5	83							
31.6	21.6	2.2	2.9	0.1	0.4	91							
calcareous													
calcareous													
calcareous													
calcareous													

Soil type: Shelby clay loam, thin solum variant

Soil No.: S56Iowa-1-10

Location: Greenfield Quadrangle; 180 feet west and 56 feet south of northeast corner of southwest quarter of north-east quarter of southeast quarter of Section 18, T76N, R31W, Adair County, Iowa.

Slope: 6 percent, convex.

Vegetation: Bluegrass.

Collected by and date: R. E. Daniels, July 17, 1956.

Horizon and

Beltsville

Lab. Number

A1 0 to 4 inches. Very dark brown (10YR 2/2 to 2.5/2) friable to slightly firm light to medium clay loam; weak to moderate fine and very fine granular structure; clear boundary to AB.

5777

4 to 8 inches. Very dark gray brown (10YR 2/3) friable to slightly firm medium clay loam with some

clear boundary to B2.

B2 0 to 12 inches. Dark brown (10YR 4/2 to 4/2.5) friable to slightly firm medium clay loam.



OIL TYPE ShelbyLOCATION Shelby County, IowaloamSOIL NOS. 855Iowa-83-3LAB. NOS. 5370-5376

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a										
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			2A2	
		2.1	1.0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	> 2 < 9mm	
0-6	Alp	1.4	3.5	4.5	12.5	8.4	39.5	30.2	38.8	16.0	1	cl
6-11	A3	1.9	3.4	4.1	11.2	8.0	37.0	34.4	35.1	16.1	1	cl
11-16	B21	2.1	3.7	4.2	11.5	8.1	36.0	34.4	34.2	16.1	3	cl
16-22	B22	2.7	4.0	4.1	10.8	8.1	35.8	34.5	32.7	17.2	2	cl
22-30	B3	2.6	4.2	4.3	10.0	8.2	37.9	32.8	32.0	20.3	2	cl
30-48	C1 a/	4.9	4.3	4.0	9.4	8.3	41.4	27.7	31.1	24.4	3	cl
48-54	C2	3.4	4.0	4.3	10.0	8.8	42.5	27.0	33.7	23.9	2	cl
pH 8C1a		ORGANIC MATTER				ESTD SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC-103 MILLIMOS PER CM 25°C	6E1a CaCO <sub>3</sub> equiv- alent	MOISTURE TENSIONS			4B2 18 ATMOS.
		6A1a	6B1a						1/10 ATMOS.	1/3 ATMOS.		
		ORGANIC CARBON	NITRO- GEN	C/N					%	%	%	
1:1	1:5	1:10	%	%								
5.4	5.6	5.8	1.82	.161	11.3		0.5					11.7
5.7	5.9	6.0	1.46	.125	11.7		0.5					12.7
5.8	6.0	6.1	1.14	.099	11.5		0.4					12.3
6.1	6.2	6.4	0.89	.081	11.0		0.4					12.1
6.7	6.8	6.9	0.56	.054	10.4		0.5	-				11.9
8.0	8.5	8.6	0.24				0.6	14				10.4
8.0	8.4	8.6	0.07				0.7	11				11.2
5A1a		EXTRACTABLE CATIONS 5B1a				BASE SAT. % NH <sub>4</sub> Ac EXCH.	SATURATION EXTRACT SOLUBLE 8A1				8A	
CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	6N2b	6O2b	6H1a	6P2a	6Q2a		6P1a	6Q1a	6N1a	6O1a	MOISTURE AT SATU- RATION	
	Ca	Mg	H	Na	K		Na	K	Ca	Mg		
milliequivalents per 100g. soil					5C1	milliequivalents per liter					%	
22.0	14.3	3.3	8.7	-	0.4	82	0.5	0.2	3.3	1.3	45.1	
22.8	16.0	3.4	6.7	-	0.4	87	0.4	0.2	3.2	1.2	46.8	
22.2	15.7	3.0	5.8	-	0.4	86	0.4	0.2	3.1	1.0	47.3	
21.0	15.8	2.6	5.0	-	0.4	90	0.4	0.1	2.7	0.8	50.4	
19.4	16.6	2.2	2.9	0.1	0.4	99	0.5	0.1	3.6	0.6	54.8	
14.6		1.6	1.2	0.1	0.3		0.5	0.1	4.6	0.8	48.3	
13.4		2.0	0.8	0.1	0.3		0.7	0.1	4.7	1.2	48.5	

a/ Some CaCO<sub>3</sub> present in sand fraction

a/ Some CaCO<sub>3</sub> present in sand fraction

Soil type: Shelby loam

Soil No.: 855Iowa-83-3

Location: 265 feet east and 125 feet north of southwest corner of NW1/4 of Sec. 25, T79N, R37W, Shelby County, Iowa.

Site: Gently convex slope of 12 percent gradient; western exposure.

Collected by and date: W. M. Jury, L. E. Tyler, and F. J. Carlisle, August 23, 1955.

# Horizon and

## Lincoln

### Lab. Number

Alp 5370	0 to 6 inches. Black to very dark gray (10YR 2.5/1) heavy loam; cloddy breaking to weak very fine crumb structure; friable when moist; noncalcareous; gradual boundary.
A3 5371	6 to 11 inches. Very dark grayish brown (10YR 3/2) medium loam with mixture of slightly darker and slightly browner colors; friable when moist; moderate fine and very fine subangular blocky structure; boundary clear; noncalcareous. (If textural difference from Alp, probably depositional rather than genetic.)
B21 5372	11 to 16 inches. Mixed very dark grayish brown (10YR 3/2) and dark brown to brown (10YR 4/3) gritty medium silty clay loam (probably the mixing is due to biological action); weak fine subangular blocky structure; slightly firm when moist; noncalcareous; gradual boundary.
B22 5373	16 to 22 inches. Brown or dark brown (10YR 4/3) to dark yellowish brown (10YR 4/4) heavy silty clay loam; weak, medium and fine subangular blocky structure with thin discontinuous colloidal coatings on peds; firm when moist; noncalcareous; gradual boundary.
B3 5374	22 to 30 inches. Dark brown to brown (10YR 4/3) medium silty clay loam with a few fine faint yellowish brown and strong brown mottles; weak medium subangular blocky structure; firm when moist; noncalcareous; clear boundary.
C1 5375	30 to 48 inches. Dark yellowish brown (10YR 4/4) medium clay loam with finely disseminated, white carbonate concretions and common, fine, distinct, yellowish brown, strong brown and gray brown mottles; weak medium and coarse subangular blocky structure; firm when moist; diffuse boundary.
C2 5376	48 to 54 inches. Yellowish brown mottled with strong brown and gray light to medium clay loam; massive or fragmental structure; firm when moist; calcareous.

Note: The 42- to 48-inch layer has a few large white carbonate concretions 3 to 4 inches in diameter. Coarse sand and gravel content of profile increases with depth.

SOIL TYPE Shelby  
silt loamLOCATION Shelby County, IowaSOIL NOS. S53Iowa-83-3LAB. NOS. 5377-5382

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)										TEXTURAL CLASS
		1B1a							3A1		2A2	
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2	
		2-1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002	(19mm)	
0-7	A1	1.2	1.7	2.2	5.6	5.2	52.4	31.7	38.1	23.1	Tr.	sic1
7-12	B1	2.9	2.7	2.7	6.6	6.3	39.5	39.3	30.2	19.9	1	cl
12-22	B2	1.4	2.7	3.2	7.7	7.0	38.6	39.4	29.6	20.8	Tr.	cl
22-30	B3	2.1	3.1	3.4	8.4	7.5	40.2	35.3	30.3	22.6	Tr.	cl
30-42	C1	2.8	2.8	3.3	8.1	7.6	41.7	33.7	31.5	23.0	Tr.	cl
42-46	C2	2.4	3.0	3.1	8.7	7.7	41.7	33.4	31.9	22.4	Tr.	cl
pH 8C1a		ORGANIC MATTER				ESTM SALT (BUREAU CUP)	ELECTRI- CAL CONDUCT- IVITY EC x 10 <sup>3</sup> MILLIMHS PER CM	6E1a CaCO <sub>3</sub> equiv- alent	GYPSUM no./100g. SOIL	MOISTURE TENSIONS		
1:1	1:5	1:10	6A1a ORGANIC CARBON	6B1a NITRO- GEN	C/N					1/10 ATMOS.	1/3 ATMOS.	4B2 15 ATMOS.
			%	%						%	%	%
5.9	6.2	6.3	2.91	.236	12.3							15.1
6.0	6.3	6.4	0.73	.076	9.6							14.3
5.8	6.1	6.3	0.37	.034	10.9							13.2
5.5	5.7	5.9	0.26	.028	9.3							12.7
5.4	5.7	5.8	0.22									12.7
5.7	6.1	6.1	0.19									12.8
5A1a	EXTRACTABLE CATIONS 5B1a					BASE SAT. % NH <sub>4</sub> Ac EXCH.	SATURATION EXTRACT SOLUBLE				MOISTURE AT SATU- RATION %	
CATION EXCHANGE CAPACITY NH <sub>4</sub> Ac	6N2b	6O2b	6H1a	6P2a	6Q2a		No	K				
	Ca	Mg	H	Na	K							
← milliequivalents per 100g. soil → 5C1 ← milliequivalents per liter →												
27.0	19.4	4.4	7.9	-	0.7	91						
26.0	19.0	5.0	5.9	0.1	0.7	95						
25.2	18.5	4.8	6.7	0.1	0.6	95						
23.0	17.1	3.9	5.4	0.1	0.5	94						
21.7	16.7	3.3	5.1	0.1	0.5	95						
21.7	18.2	2.9	3.3	0.1	0.5							

Soil type: Shelby silt loam

Soil No.: S53Iowa-83-3

1/1/62

Site: Gently convex north-facing slope of 15 percent gradient. Soil was sampled 42 feet downslope from the outcrop of the late Sangamon paleosol B horizon. The ground surface at the sampling site was 5 feet lower in elevation than the top of the paleosol B upslope, which outcropped upslope.  
Collected by and date: O. D. Friedrich, August, 1953.

Horizon and  
Lincoln  
Lab. Number

A1 5377	0 to 7 inches. Very dark gray (10YR 3/1) silt loam; granular; friable; some gray coatings on peds; clear boundary.
B1 5378	7 to 12 inches. Brown (10YR 4.5/3) clay loam, crushed color 4/2.5; very fine subangular blocky structure; firm; some streaks of very dark gray (10YR 3/1) material; clear boundary.
B2 5379	12 to 22 inches. Yellowish brown (10YR 5/5) clay loam with very fine subangular blocky structure; firm; gradual boundary.
B3 5380	22 to 30 inches. Olive brown to light olive brown (2.5Y 4.5/4) clay loam with fine subangular blocky structure; firm; some material included with dark yellowish brown color (10YR 4/4); gradual boundary.
C1 5381	30 to 42 inches. Light olive brown (2.5Y 5/3) clay loam; weak subangular blocky structure to massive with strong vertical cleavage; firm; some 10YR 4/4 mottling and some dark oxide concretions; slightly calcareous with some carbonate concretions; gradual boundary.
C2 5382	42 to 46 inches. Similar to horizon above but with numerous dark yellowish brown mottles; massive with strong vertical cleavage.

SOIL SURVEY LABORATORY Lincoln, Nebr. Sept., 1963

SOIL TYPE Taintor LOCATION Keokuk County, Iowa  
Silty clay loam

SOIL NOS. S61Iowa-54-3 LAB. NOS. 16308-16317

		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)											TEXTURAL CLASS
DEPTH INCHES	HORIZON	1B1b		3A1					2A2				
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY	> 2				
		2.1	1.0-5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002			
0-6	A1p	-	0.2a	0.1a	0.1a	0.3a	62.7	36.6	24.3	38.8	-		
6-12	A12	-	0.1a	0.1a	0.1a	0.3a	58.3	41.1	22.9	35.8	-		
12-17	A3	0.1a	0.1a	0.1a	0.1a	0.3a	56.5	42.8	21.6	35.3	-		
17-22	B1	0.2a	0.3a	0.2a	0.2a	0.4a	55.9	42.8	21.2	35.2	-		
22-28	B21	0.6a	0.6a	0.2a	0.4a	0.5a	56.6	41.1	23.8	33.5	-		
28-34	B22	0.2a	0.2a	0.1a	0.2a	0.8b	62.6	35.9	28.6	34.9	-		
34-40	B31	0.2a	0.2a	0.1a	0.2a	0.9b	63.7	34.7	29.6	35.1	-		
40-50	B32	-	0.1a	0.2a	Tr.a	0.6c	67.7	31.4	32.1	36.2	-		
50-60	B33	-	0.2a	0.2a	0.3a	0.6c	70.8	27.9	32.9	38.6	-		
60-70	C1	-	0.2a	0.2a	0.2a	0.6d	72.6	26.2	34.0	39.3	-		
8C1a	6E1b	Organic Matter					Bulk Density			Moisture Retention			
	CaCO <sub>3</sub>	6A1a	6B1a							4B1b	4C1	4B2	
pH	Equiv-	O.C.	N	C/N	Field Moist	30 Cm.	A.D.	1/3-Bar	15-to	15-Bar			

Soil type: Taintor silty clay loam

Soil No.: 85Iowa-54-3

Location: 385 feet north and 51 feet east of SW corner of SE1/4 SW1/4 Sec. 27, T77N, R10W, Keokuk County, Iowa.

Vegetation: Clover field, recently plowed. Parent material: Wisconsin loess.

Physiographic position: Broad upland divide about 1/2-mile wide. Appears to be highest elevation within the watershed.

Slope: Less than 1 percent.

Drainage: Poorly drained.

Permeability: Slow to moderately slow.

Ground water: Water table at 40 inches.

Moisture: Very moist.

Described by: D. F. Slusher, October 4, 1961.

Horizon and

Lincoln Lab. No.

Alp 0 to 6 inches. Black (N 2/)<sup>1</sup> medium silty clay loam, very dark gray (10YR 3/1) when dry; moderate fine and medium angular blocky structure; firm<sup>2</sup>; kneaded color remains the same; abrupt smooth boundary.

A12 6 to 12 inches. Black (N 2/) medium silty clay loam, very dark gray (N 3/0) when dry; moderate very fine sub-angular blocky and moderate fine granular structure; friable to firm; kneaded color about one unit higher in value and chroma; gradual smooth boundary.

A3 12 to 17 inches. Black (N 2/) heavy silty clay loam; very dark gray (10YR 3/1) when dry; moderate very fine subangular blocky with some moderate fine granular structure; friable to firm; red exterior, black (10YR

SOIL SURVEY LABORATORY Lincoln, Nebr. Sept., 1963

**SOIL TYPE** Taintor  
silty clay loam

**LOCATION** Washington County, Iowa

**silty clay loam**

SOIL NOS. S61IOWA-92-3 LAB. NOS. 16331-16342

		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1											
										2A2			
DEPTH INCHES	HORIZON	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			TEXTURAL CLASS		

Soil type: Taintor silty clay loam

Soil No.: S61Iowa-92-3

Location: 511 feet north and 743 feet west of the SE corner of SW1/4 SW1/4 Section 22, T76N, R8W, Washington Co., Iowa.

Vegetation: Clover and timothy field.

Parent material: Wisconsin loess.

Physiographic position: Moderately broad upland divide about 1/4-mile wide; appears to be highest elevation within the watershed.

Slope: Less than 1 percent.

Drainage: Poorly drained.

Permeability: Slow to moderately slow.

Ground water: Water table at 53 inches.

Moisture: Very moist.

Described by: R. I. Maderiksen and A. R. Hildebaugh  
October 4, 1961.

Horizon and  
Lincoln Lab. No.

Alp 0 to 7 inches. Black (N 2/)<sup>1</sup> medium silty clay loam, 10YR 3/1 dry, 10YR 2/1 kneaded; moderate medium sub-angular blocky breaking to weak fine granular structure; friable to firm<sup>2</sup>; many wormholes, few worm casts; abrupt smooth boundary.

A12 7 to 13 inches. Black (N 2/) medium silty clay loam, N 3/0 dry and kneaded; moderate fine subangular blocky structure; friable; common fine and very fine lined tubular pores; distinct moderate films on ped surfaces.

A3 13 to 18 inches. Black (N 2/) medium silty clay loam, 10YR 3/1 dry, 10YR 2/1 kneaded; weak medium prismatic breaking to moderate fine subangular blocky structure; friable to firm; few fine and many very fine inped tubular pores; some mixing of very few 2.5Y 3/2 peds at 15 to 18 inches; common very fine soft concretions and few very fine hard oxide concretions; common wormholes and few 10YR 2/1 worm casts; clear smooth boundary.

B21 18 to 23 inches. Very dark gray (5Y 3/1) and very dark grayish brown (2.5Y 3/2) heavy silty clay loam, 10YR 4/1 dry; moderate medium prismatic breaking to moderate to strong very fine subangular blocky structure; firm to friable; ped exteriors are 5Y 3/1, interiors are 2.5Y 3/2; common distinct 10YR 2/1 stains in some places; common fine distinct 10YR 5/4 mottles; common fine distinct segregations of 7.5YR 5/6; many fine and very fine inped tubular pores; thin distinct continuous clay films on all peds; common medium soft concretions and few fine hard oxide concretions; common wormholes with few 10YR 2/1 worm casts; gradual smooth boundary.

B22 23 to 28 inches. Very dark gray (5Y 3/1) mixed with 2.5Y 3/2 heavy silty clay loam; moderate medium prismatic breaking to strong fine and very fine subangular blocky structure; firm; majority of ped exteriors are 5Y 3/1 with some 2.5Y 3/2 in places; interiors are 2.5Y 3/2; few distinct 10YR 3/1 stains oriented on prism faces (less than in B21); common very fine distinct 10YR 5/4 mottles; very few distinct segregations of 7.5YR 5/6; common very fine and fine inped tubular pores; many moderately thick distinct clay films on



Lincoln, Nebr.

## LOCATION

**LOCATION** Tama County, Iowa

**LAB. NOS.**

LAB. NOS. 11528-11537

- a. Many (Fe-Mn?) concr.
- b. Common (Fe-Mn?) concr.
- c. Few (Fe-Mn?) concr.
- d. Trace (Fe-Mn?) concr.

Soil type: Tama silty clay loam

Soil No.: 859Iowa-86-1

Location: 140 feet south of east-west fence and 43 feet west of north-south fence of the northeast corner of the S1/2 of NW1/4 of NW1/4 of Sec. 14, T85N, R13W, Tama County, Iowa, on the R. L. and R. D. Wilson farm.

Vegetation: Oats, sown to alfalfa; very productive soil.

Slope: 2 to 3 percent gradient, slightly convex.

Parent material: Loess of Wisconsin age which overlies mainly Iowan and Kansan glacial till; at this profile site the loess was 61 inches thick and deposited on Iowan glacial till.

Drainage: Well drained.

Sampled by and date: F. F. Riecken, W. D. Shrader, R. I. Turner, and E. C. A. Ruge, July 23, 1959.

# Horizon and

## Lincoln

### Lab. Number

Ap 0 to 6½ inches. Black to very dark brown (10YR 2/1.5 moist), friable to slightly firm, light silty clay loam; crushed color very dark brown (10YR 2/2 moist); massive, breaking to weak fine to medium subangular blocky structure; abundant earthworms, earthworm holes, and roots; gradual boundary.

A12 6½ to 11 inches. Black to very dark brown (10YR 2/1.5 moist), friable, heavy silt loam; crushed color very dark brown (10YR 2/2 moist); moderate fine to medium granular structure; abundant earthworms.

11520

earthworm holes, and roots; gradual boundary.

A3 11 to 16½ inches. Mixed black to very dark brown and very dark grayish brown (10YR 2/1.5 and 10YR 3/2 moist), darker color on peds, friable, light silty clay loam; moderate fine subangular blocky structure; abundant earthworms, earthworm holes, and roots; gradual boundary.

11530

B1 16½ to 20 inches. Mixed very dark grayish brown and brown to dark brown (10YR 3/2 and 4/3 moist), darker color on peds, friable, light silty clay loam; crushed color very dark brown to brown (10YR 4/3 moist); ped surfaces have very thin gray, grainy coats over much of surface; moderate fine subangular blocky structure; abundant roots and common earthworm holes; gradual boundary.

11531

B21 20 to 25 inches. Mixed very dark grayish brown and dark grayish brown (10YR 3/2 and 4/2 moist), darker color on peds, slightly firm, light silty clay loam; crushed color brown to dark yellowish brown (10YR 4/3.5 moist); ped surfaces have very thin gray, grainy coats as in above horizon; moderate fine to medium subangular blocky structure; abundant roots and common earthworm holes and small pores; gradual boundary.

11532

B22 25 to 29 inches. Brown to dark brown (10YR 4/3 moist) with some dark yellowish brown (10YR 3/4 moist) ped coats, friable to slightly firm, light silty clay loam; crushed color brown to dark brown (10YR 4/3.3 moist); very thin gray, grainy ped coats much more patchy than in above two horizons; moderate medium subangular blocky structure; abundant roots and common earthworm holes and small pores; gradual boundary.

11533

B23 29 to 35 inches. Brown to dark brown (10YR 4/3.5 moist) with dark yellowish brown (10YR 4/4 moist) inside peds, friable to slightly firm, light silty clay loam; crushed color dark yellowish brown (10YR 4/4 moist); very thin gray grainy ped coats as in above horizon; weak fine prismatic breaking to moderate medium subangular blocky structure; abundant roots and common earthworm holes and pores; gradual boundary.

11534

B31 35 to 45 inches. Dark yellowish brown to yellowish brown (10YR 4.5/4 moist), friable to slightly firm, light silty clay loam; few fine faint brown to yellowish brown (10YR 5/3 and 5/6 moist) mottles; very thin patchy gray, grainy ped coats as in above horizon; weak medium prismatic breaking to moderate to weak medium subangular blocky; abundant roots and pores and few to common earthworm holes; gradual boundary.

11535

B32 45 to 51 inches. Yellowish brown (10YR 5/4 moist) with brown (10YR 5/3 moist) coatings on prism faces, friable silt loam; common fine distinct yellowish brown and light brownish gray (10YR 5/6 and 6/2 moist) mottles; definite gray to light gray (10YR 6/1 dry) grainy coats along prism faces; weak coarse prismatic structure; common roots and plentiful pores; few fine soft dark iron or manganese concretions; gradual boundary.

11536

C1 51 to 61 inches. Yellowish brown (10YR 5/4 moist) with brown (10YR 5/3 moist) coatings on prism faces, friable silt loam; few fine faint yellowish brown and light brownish gray (10YR 5/6 and 6/2 moist) mottles; definite gray to light gray (10YR 6/1 dry) grainy coats along prism faces; weak coarse prismatic structure; common roots and plentiful pores; few fine soft dark iron or manganese concretions; a large, 3- to 4-inch, krotovina with abundant roots in horizon.

11537

SOIL SURVEY LABORATORY Lincoln, Nebr. Sept., 1963

SOIL TYPE Winterset LOCATION Madison County, Iowa  
silty clay loam

SOIL NOS. 361Iowa-61-2 LAB. NOS. 16355-16367

		PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1		2A2	Textural Class
DEPTH INCHES	HORIZON	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			> 2		
		2.1	1-0.5	0.5-0.25	0.25-0.10	0.10-0.05	0.05-0.002	< 0.002	0.2-0.02	0.02-0.002			
0-7	Alp	0.1	0.2	0.2	0.4	0.7	70.0	28.4	31.1	39.8	-		
7-13	A12	0.2	0.4	0.6	0.5	0.9	64.6	32.8	29.7	36.0	-		
13-18	A3	0.2	0.4	0.4	0.6	0.9	60.6	36.9	28.2	33.6	-		
18-24	B21	0.3	0.5	0.4	0.5	0.8	56.8	40.7	25.9	31.9	-		
24-28	B22	0.6	0.7	0.4	0.6	0.8	55.0	41.9	24.4	31.7	-		
28-34	B23	0.3	0.3	0.2	0.4	1.1	56.7	41.0	26.3	31.7	-		
34-40	B31	0.5	0.6	0.3	0.5	1.0	58.9	38.2	28.0	32.2	-		
40-47	B32	0.4	0.7	0.4	0.6	0.9	61.6	35.4	28.9	34.0	-		
47-56	B3C1	0.2	0.4	0.3	0.6	1.0	63.7	33.8	30.6	34.5	-		
56-63	C1	0.1	0.2	0.2	0.7	1.0	67.3	30.5	34.1	34.7	-		
63-71	C2	0.1	0.3	0.3	0.6	1.0	68.3	29.4	34.3	35.4	-		
71-75	C3	0.1	0.1	0.1	0.3	0.6	69.6	29.2	34.4	36.0	-		
75-81	C4	-	0.1	0.1	0.1	0.7	70.0	29.0	36.0	34.8	-		
8C1a	6E1b	Organic Matter			Bulk Density				Moisture Retention				
	CaCO <sub>3</sub>	6A1a	6B1a							4B1b	4C1	4B2	
pH	equiv-	O.C.	N	C/N	Field Moist		30 Cm.	A.D.	1/3-Bar	15-to	15-Bar		
1-1	element				4B1 4A1a	4B2 4A1a	4B3 4A1a	4A1b	Pieces	1/3-Bar	Sieved		

Soil type: Winterset silty clay loam

Soil No.: S61Iowa-61-2

Location: 400 feet north of road center and 25 feet west of SE corner of SW 1/4, R. 10, T. 10, S. 10, Sec. 1, Twp. 10N, R. 10W, S. 10E, Iowa

County, Iowa.

Physiographic position: Broad upland divide; appears to be highest elevation within the watershed.

Vegetation: Clover field.

Slope: Less than 1 percent.

Ground water: Water table at 40 inches.

Parent material: Wisconsin loess.

Drainage: Poorly drained. Moisture: Very moist.

Permeability: Slow to moderately slow.

Described by: R. I. Mideriksen and A. R. Hildebaugh,  
October 9, 1961.

Horizon and

Lincoln Lab. No.

- Alp 0 to 7 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam, 10YR 4/1 dry; moderate medium subangular blocky structure; firm; common wormholes and casts; abundant fine root channels; abrupt smooth boundary.
- 16355
- A12 7 to 13 inches. Black (10YR 2/1) light silty clay loam, 10YR 4/1 dry; moderate fine granular and few peds with weak subangular blocky structure; friable; very faint grainy coatings noted when moist and distinct when dry; common fine and very fine imbed tubular pores; common wormholes and casts; gradual smooth boundary.
- 16356
- A3 13 to 18 inches. Black (10YR 2/1) medium silty clay loam, 10YR 5/1 dry, 10YR 2/2 kneaded; weak very fine subangular blocky structure; friable to firm; very faint grainy coatings noted when moist and distinct when dry; many fine and very fine imbed tubular pores; few very fine soft oxide concretions; common wormholes and casts; clear smooth boundary.
- 16357
- B21 18 to 24 inches. Very dark gray (10YR 3/1) mixed with 2.5Y 3/2 medium to heavy silty clay loam, 10YR 5/1 dry, 2.5Y 3/2 kneaded; moderate to strong very fine subangular blocky structure; friable to firm; very faint imbedded grainy coatings noted when moist, distinct when dry; majority of peds are 10YR 3/1 but a few are 2.5Y 3/2; many fine and very fine imbed tubular pores; thin continuous clay films on all ped surfaces; few very fine soft concretions and few fine hard oxide concretions; few wormholes and casts; clear smooth boundary.
- 16358
- B22 24 to 28 inches. Dark gray (10YR 4/1) mixed with 2.5Y 3/2 heavy silty clay loam; weak medium prismatic breaking to strong fine and medium subangular blocky structure; firm; ped exteriors are 10YR 4/1, interiors 2.5Y 3/2, with common fine distinct 10YR 4/4 mottles; few fine imbed tubular pores; distinct moderately thick continuous clay films on all peds; few very fine hard concretions and common very fine soft oxide concretions; clear wavy boundary.
- 16359
- B23 28 to 34 inches. Dark gray (5Y 4/1) and olive gray (5Y 5/2) medium silty clay loam; weak medium prismatic breaking to moderate medium subangular blocky structure; firm; ped exteriors are 5Y 4/1, interiors 5Y 5/2, with common fine distinct 2.5Y 4/4 and few fine distinct 10YR 5/4 mottles; common 10YR 3/1 stains on vertical cleavage faces; many fine and very fine imbed tubular pores; thin discontinuous clay films on peds; few fine hard spherical and moderately hard tubular-shaped concretions and few fine soft oxide concretions; gradual smooth boundary.
- 16360
- B31 34 to 40 inches. Gray (5Y 5/1) and olive gray (5Y 5/2) medium silty clay loam, 5Y 5/3 kneaded; moderate medium prismatic breaking to moderate medium subangular blocky structure; firm; ped exterior colors mixed so majority of peds are 5Y 5/1 with some 5Y 4/1 in places; interiors 5Y 5/2 with common fine 2.5Y 4/4 and few fine distinct 10YR 4/4 mottles; few distinct 7.5YR 5/6 segregations; some 10YR 3/1 stains on prism faces; many fine and very fine imbed tubular pores; thin discontinuous clay films on prism faces and some peds; common to many fine and medium soft oxide concretions; gradual wavy boundary.
- 16361
- B32 40 to 47 inches. Gray (5Y 5/1) and olive gray (5Y 5/2) light to medium silty clay loam; weak coarse prismatic breaking to weak medium to coarse angular blocky structure; firm; ped exteriors are 5Y 5/1, interiors are 5Y 5/2 with common to many fine distinct 10YR 5/4 mottles; common distinct 7.5YR 5/6 segregations; many very fine and fine imbed tubular pores; few thin discontinuous clay films on prism faces; common 10YR 3/1 clay fills in fine pores; many fine soft oxide concretions; gradual smooth boundary.
- 16362
- B3C1 47 to 56 inches. Olive gray (5Y 5/2) and gray (5Y 5/1) light silty clay loam; weak coarse prismatic breaking to weak coarse angular blocky structure; firm; peds predominantly 5Y 5/2 with few exteriors 5Y 5/1; many medium 2.5Y 4/4 mottles; common distinct 7.5YR 5/6 vertical streaks; many medium and fine imbed tubular pores; common 10YR 3/1 clay fills in pores with very few thin discontinuous clay films on some prism faces; common coarse soft concretions and few fine hard oxide concretions; gradual smooth boundary.
- 16363
- C1 56 to 63 inches. Olive gray (5Y 5/2) light silty clay loam; massive with some vertical cleavage; firm; common medium 10YR 5/4 mottles; common prominent 7.5YR 5/6 vertical streaks; some vertical cleavage faces have gray (5Y 5/1) exteriors; common medium and fine imbed tubular pores; few 10YR 3/1 clay fills in very fine and fine pores; many fine soft oxide concretions; clear wavy boundary.
- 16364
- C2 63 to 71 inches. Predominantly yellowish brown (10YR 5/6) mixed with 5Y 5/2 heavy silt loam; massive with some vertical cleavage; firm; prominent wavy 7.5YR 5/6 horizontal band and a few individual segregations; common medium and fine imbed tubular pores; common 10YR 3/1 clay fills (more distinct than in horizons above or below) in very fine and fine pores; very few very fine soft oxide concretions; clear smooth boundary.
- 16365
- C3 71 to 75 inches. Light olive gray (5Y 6/2) silt loam; massive with some vertical cleavage; firm; common large prominent 7.5YR 5/6 and common fine distinct 10YR 5/6 mottles; many medium and fine imbed tubular pores; few 10YR 3/1 clay fills in very fine pores but most pores free of clay or stains; common fine soft oxide concretions and smears; matrix not calcareous but a hard carbonate concretion present at 72 inches; diffuse smooth boundary.
- 16366
- C4 75 to 81 inches. Light olive gray (5Y 6/2) silt loam; massive with some vertical cleavage; firm; common fine faint 2.5Y 4/4 mottles; many medium and fine imbed tubular pores; few 10YR 3/1 clay fills in very fine pores; common very fine soft oxide concretions and a few 5 to 10 mm. in diameter moderately hard tubular concretions; few hard carbonate concretions but matrix is not calcareous.
- 16367

Remarks: Roots plentiful from 0 to 18 inches, common from 18 to 28, few from 28 to 56, and nearly absent below 56 inches. Several krotovinas present below 62 inches; there is a black (N 2/0) clay coating in krotovina and interiors have some mixed olive gray and strong brown material. Oxides are spherical in shape, dark brown to black, and considered predominantly iron-manganese unless otherwise noted. Strong brown (7.5YR 5/6 to 5/8) segregations, horizontal bands, and vertical streaks are considered higher in iron oxide than the associated matrix. Horizons Alp, B22 and C3 were sampled for the Bureau of Public Roads.

Lincoln, Nebr. Sept., 1963

gilty clay loam

S61Iowa-61-3

- a. 18 Kg/M<sup>2</sup> to 60 inches.
- b. No carbonate clay.

Soil type: Winterset silty clay loam

Vegetation: Clover field.

Physiographic position: Broad upland divide.

Slope: Less than 1 percent.

Permeability: Slow to moderately slow.

Moisture: Very moist.

Parent material: Wisconsin loess.

Appears to be the highest elevation within the watershed.

Drainage: Poorly drained.

Ground water: Water table at 30 inches.

Described by: D. F. Slusher and A. R. Hiddlebaugh, Oct. 11, 1961.

Horizon and  
Lincoln Lab. No.

- A1p 0 to 7 inches. Black (10YR 2/1)<sup>1</sup> light silty clay loam, dark gray (10YR 4/1) when dry; weak medium subangular blocky structure; firm<sup>2</sup>; kneaded color remains the same; very few fine hard concretions of an oxide; clear smooth boundary.
- A12 7 to 13 inches. Black (10YR 2/1) light silty clay loam, dark gray (10YR 4/1) when dry; moderate fine granular structure; friable; very faint grainy coatings when moist, distinct when dry; moist chroma slightly less than 1; kneaded color black (10YR 2/1); very few fine hard concretions of an oxide; gradual smooth boundary.
- A13 13 to 19 inches. Black (10YR 2/1) medium silty clay loam, gray (10YR 5/1) when dry; moderate fine subangular blocky structure; friable; very faint grainy coatings when moist, distinct when dry; kneaded color black (10YR 2/1) to very dark gray (10YR 3/1); few fine hard concretions of an oxide--slightly more than in above horizon; gradual smooth boundary.
- A3 19 to 25 inches. Very dark gray (10YR 3/1) and black (10YR 2/1) medium silty clay loam; gray (10YR 5/1) when dry; moderate very fine subangular blocky structure; friable to firm; very faint imbedded grainy coatings when moist, distinct when dry; majority of peds very dark gray (10YR 3/1) with few black (10YR 2/1) peds in places; common fine faint dark grayish brown to olive brown (2.5Y 4/3) mottles; kneaded color very dark grayish brown (2.5Y 3/2); common very fine and fine imbed tubular pores; few to common fine hard concretions of an oxide; gradual smooth boundary.
- B21 25 to 32 inches. Very dark gray (10YR 3/1) and dark grayish brown (2.5Y 4/2) heavy silty clay loam; weak medium prismatic breaking to moderate very fine subangular blocky structure; firm; ped exteriors are very dark gray (10YR 3/1) with common fine distinct dark yellowish brown (10YR 4/4) and common fine faint olive brown (2.5Y 4/4) mottles; ped interiors are dark grayish brown (2.5Y 4/2) with common medium distinct yellowish brown (10YR 5/4) mottles; few black (10YR 2/1) stains on ped exteriors; kneaded color dark grayish-brown (2.5Y 4/2); very few very fine imbed tubular pores; common thin discontinuous clay films on prism and ped faces; many fine hard concretions of an oxide 27 inches and below; gradual smooth boundary.
- B22 32 to 39 inches. Dark gray (5Y 4/1) and mixed grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) heavy silty clay loam; moderate medium prismatic breaking to moderate fine subangular blocky structure; ped exteriors are dark gray (5Y 4/1) with common fine distinct dark yellowish brown (10YR 4/4) mottles; ped interiors grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) mixed in about equal proportions; common very dark gray (10YR 3/1) stains on prism faces; kneaded color grayish brown (2.5Y 5/2); few fine imbed tubular pores; common thin discontinuous clay films on prism and ped surfaces; many fine hard and a few soft concretions of an oxide to 36 inches; gradual smooth boundary.
- B31 39 to 48 inches. Mixed dark gray (5Y 4/1) with very dark gray (10YR 3/1) and olive gray (5Y 5/2) medium silty clay loam; moderate medium prismatic breaking to moderate medium subangular blocky structure; firm; majority ped exteriors dark gray (5Y 4/1) with about equal proportions very dark gray (10YR 3/1) in some places; ped interiors olive gray (5Y 5/2) with many fine prominent yellowish brown (10YR 5/6) mottles; few black (10YR 2/1) stains on prism faces; kneaded color grayish brown to light olive brown (2.5Y 5/3); common fine imbed tubular pores; common discontinuous clay films mainly on prism faces and few very dark gray (10YR 3/1) clay flows 2 to 3 mm. wide on prism faces; common fine hard and few fine soft concretions of an oxide; gradual wavy boundary.
- B32 48 to 58 inches. Mixed dark gray (5Y 5/1), olive gray (4Y 5/2), and very dark gray (10YR 3/1) medium silty clay loam; moderate coarse prismatic breaking to weak coarse subangular blocky structure; majority ped exteriors are dark gray (5Y 4/1) with common olive gray (5Y 5/2) and few very dark gray (10YR 3/1) and mottled with common fine distinct olive brown (2.5Y 4/4); ped interiors olive gray (5Y 5/2) with few fine faint olive brown mottles; few medium segregations prominent strong brown (7.5YR 5/6); common fine imbed tubular pores; common thin discontinuous clay films on very dark gray prism faces; a few very dark gray (10YR 3/1) clay flows 2 to 3 mm. wide in root channels, and a few saucer-shaped clay accumulations 5 to 10 mm. in diameter; few fine soft concretions of an oxide; gradual smooth boundary.